CHEMICAL INDUSTRIES

.. the business magazine

for makers

and users

of chemicals

Management • Research • Production • Marketing

Volume 45 Number 3

Contents for September, 1939

Editorials

Wall Street's Chemical Valuations—Far-West Chemicals—Fluorine to the Fore 257

Feature Articles

Naval Stores, 1919-1939 By Dr. Eldon Van Romaine 259

Silver as a Raw Material (Part II) By Robert H. Leach 265

Newer Plastics May Solve Your Problem—A Collaboration By Gustavus Esselen, Inc., Arthur D. Little, Inc., and Skinner & Sherman, Inc. 270

Recovery of Waste Vapors By E. L. Luaces 276

Plant Operation and Administration

Measuring Combustibility of Gas-Air Mixtures By F. Rutledge Davis 289

The Pulse of Opinion—The T.N.E.C. Patent Law Proposals A Symposium 292

New Equipment 294

New Chemicals for Industry

Sanitizing By Frederic L. Hilbert 295

New Processes, New Products 298

Chemical Specialties for Industry

Industrial Preservatives By Benjamin Levitt 299

Specialty Maker's Plant Notebook By Charles S. Glickman 301

Booklets and Catalogs 301

New Trade Marks 303

News of the Month in Review

Western Chemists Evaluate Their Resources By H. O. Chute 313

Rotogravure News Sections 281, 305

General News 316

The Chemical Markets 319

Prices Current 331

Part 2: Statistical and Technical Data Section

Current Statistics—Business Trends 353

Chemical Stocks and Bonds—Chemical Finance 355

Coke Production Data, 1938 357

Accident Rates in the Chemical Industry, 1938 361

Digest of U. S. Patents 363

(Index to Advertisements . . . Page 350)

Two Anniversaries

The twenty-fifth milestone in any enterprise is an event of great importance. Just a quarter of a century ago both CHEMICAL INDUSTRIES and the Exposition of Chemical Industries were conceived to serve definite needs created by the beginning of the World War.

To celebrate these two anniversaries in a way that will be of genuine service to the American chemical industry, we are planning two Silver Anniversary Numbers:

> The November Silver Anniversary Number will be devoted to Practical Plant Operation, Maintenance, and Administration.
>
> The December Silver Anniversary Number will be devoted to New Chemicals for Industry.

Outstanding Authors—Exceptionally interesting subjects—Two "must" issues you will not only want to read but to preserve indefinitely!

Published monthly, except twice in October, and entered as 2d class matter Dec. 22, 1934, at the Post Office at New Haven, Conn., under the Act of March 3, 1879. Subscription, domestic and Canada, $3 a year; foreign, $4. 522 Fifth Ave., New York, N. Y.; Chicago Office: Ned Bailey, 205 W. Wacker Drive; London Office: Donald Hunter, Sun Life Building, 2 Cockspur Street, London, S. W.1, England.

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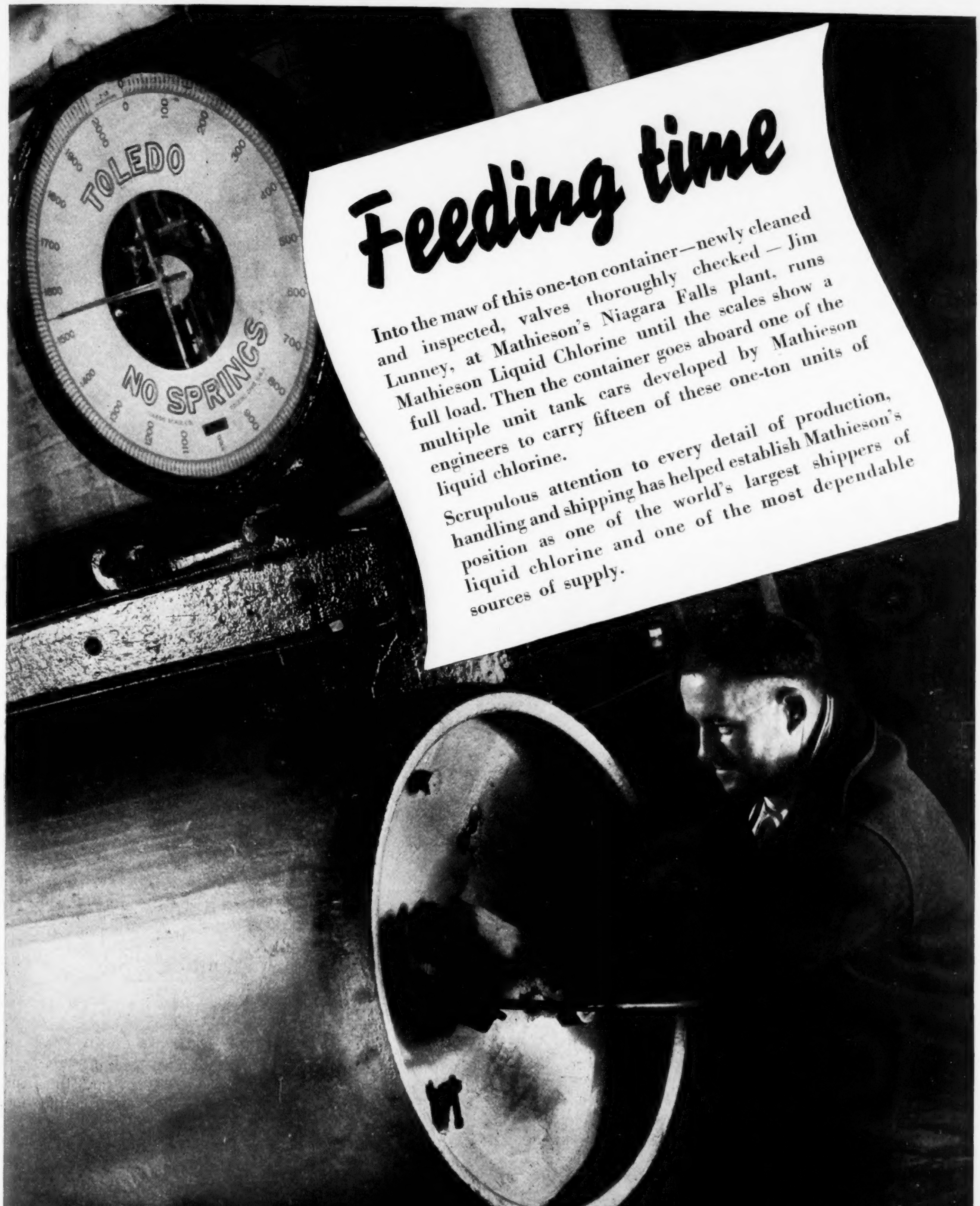

TOLEDO
NO SPRINGS
Feeding time
Into the maw of this one-ton container—newly cleaned and inspected, valves thoroughly checked — Jim Lunney, at Mathieson's Niagara Falls plant, runs Mathieson Liquid Chlorine until the scales show a full load. Then the container goes aboard one of the multiple unit tank cars developed by Mathieson engineers to carry fifteen of these one-ton units of liquid chlorine.
Scrupulous attention to every detail of production, handling and shipping has helped establish Mathieson's position as one of the world's largest shippers of liquid chlorine and one of the most dependable sources of supply.

The Reader Writes:—

Professional Men or Laborers?

The question of licensing chemists, as I see it, comes down to the very fundamental proposition as to whether or not the chemist desires to be classed as a professional man and chemistry as a profession, or whether they desire to be classed along with the other laborers—bricklayers and the like. If they are to be a profession, then it is obvious that they must take an examination and be licensed, the same as the doctors, the lawyers and dentists and all the other so-called learned professions. As it stands now, anyone who wants to label himself a chemist, is perfectly free to do so and no one can say him "Nay." If the chemists are not going to become professional men and take on a professional status, then I think that we should all of us turn in and form a chemist's union the same as they have a hod-carrier's union. We can not keep our cake and eat it. We must make the decision once and for all as to which side of the fence we want to be on. Do we want to be laborers or professional men? It seems to me that it is all a very simple and fundamental decision. There is no use trying to straddle the fence about it any longer. You can put me down as one favoring the examining and the licensing, of chemists by the States and becoming professional men along with the rest of the fellows.

HILTON IRA JONES, *Managing Director,*
Hizone Research Laboratories.
Wilmette, Ill.

Experience Alone Will Tell

It is my own opinion that the chemical profession, as a whole, has little to gain from licensure, but that in the case of a restricted group engaged in services to the public, there are some advantages which do not pertain to the profession as a whole. Whether these advantages will outweigh the disadvantages can only be determined by the experience of those states in which licensure of chemists is established.

N. K. CHANEY, *Director of Research,*
The United Gas Improvement Co.
Philadelphia, Pa.

"Wealth From Waste"

In Dr. Chute's story "Wealth From Waste" in August CHEMICAL INDUSTRIES, he shows that many of the efforts to find a profitable use for the farm and forest have failed.

The failure was due either to an insufficiency of supply of the waste to supply the demand and also because when the demand appeared, a synthetic product could be made at lower cost and of more uniform quality. Another reason was that no intensive research was made on the material. This was true of rosin and turpentine, although naval stores are primary products which have been so largely displaced by synthetic materials, as happened in the case of wood alcohol and acetic acid.

In regard to the pulp industry, I was relieved that Dr. Chute did not mention the financially disastrous attempts in recent years to make paper from cornstalks, sugar cane, bagasse and Florida saw grass.

While he presents rather too favorable a picture of finding profitable uses for waste sulfite liquor, there would appear to be some prospect for the future in at least "trading dollars" to avoid stream pollution where this becomes a serious problem.

The difficulty with the solids in the sulfite waste liquor is that in any use so far found there are other wastes either at hand or cheaper to recover, and which in general serve the purpose better—as core binder, dirt road dressing, briquet binder or adhesive are given as examples. The solids would make a fuel to generate steam but there are difficulties besides the expensive cost of evaporation. However, the researches being carried on along several lines including what Marathon is doing, show some promise of success but not much more.

In the new chemical recovery methods of soda and sulfate pulp mills there is profit in generating steam by burning the liquor and in reburning lime sludge from the causticizing operation.

Insulating board from sugar cane waste followed a successful development of a similar product from pulp mill and saw mill waste.

The demand for fiber insulation has resulted in several types of material and a number of processes to produce it. In the case of Masonite, the outstanding achievement was a new product with special qualities, a hard board or synthetic lumber that has found a wide range of uses.

To find a profitable use for a waste, involves, as you will readily understand, many complicated problems, the chief of which is economic.

W. G. MACNAUGHTON,
Newsprint Service Bureau.
New York City.

Salesmen or Executives?

It seems to me that your title "Chemical Salesman" over some of the pictures you publish is misleading. I am pretty certain that conditions have not become so bad that these men, some of whom bear titles of Chairman of the Board, President and General Manager, go out hustling for business.

I can't understand why salesmen aspire to be executives and after achieving their ambition, prefer to pose as salesmen.

Perhaps I haven't been a salesman long enough to understand.

A critical but devoted reader.

TOBIAS R. KELLER,
City Chemical Corporation.
New York City.

Editorial Note: Perhaps Critical but Devoted Reader Keller has not heard the popular definition of a sales executive—"A salesman from the home office with a better price."

CALENDAR OF EVENTS

Electrochemical Society, Fall Convention, Hotel Commodore, N. Y. City, Sept. 11-13.

A. C. S., 98th Meeting, Boston, Mass., Sept. 11-15.

National Petroleum Association, Atlantic City, N. J., Hotel Traymore, Sept. 13-15.

American Association of Textile Chemists and Colorists. Annual Convention, Copley-Plaza Hotel, Boston, Mass., Sept. 15-16.

American Ceramic Society, White Wares and Materials & Equipment Divisions, Autumn Meeting, Summit Hotel, Uniontown, Pa., Sept. 15-16.

Oil Trades Association of N. Y., Sports Day, Pelham Country Club, Pelham, N. Y., Sept. 19.

Federal Wholesale Druggists' Association, 24th annual convention, The Homestead, Hot Springs, Va., Sept. 20-22.

National Industrial Advertisers' Association Conference, Hotel New Yorker, N. Y. City, Sept. 20-22.

New Jersey Oil Trades Association, Fall Outing, Sept. 28.

American Gas Association, Annual Convention, N. Y. City, Oct. 9-10.

Packaging Institute, Inc., 1st Annual Meeting, Edgewater Beach Hotel, Chicago, Illinois, Oct. 12-13.

National Safety Congress & Exposition, Atlantic City, N. J., Oct. 16-20.

American Public Health Association, William Penn Hotel, Pittsburgh, Pa., Oct. 17-20.

Porcelain Enamel Institute, 4th Annual Forum, Ohio State University, Columbus, O., Oct. 18-20.

4th Annual Fall Meeting and Golf Tournament, Drug, Chemical & Allied Trades Section, N. Y. Board of Trade, Inc., Skytop, Pa., Oct. 20-21.

National Pest Control Ass'n, 7th Annual Convention, Hotel Pennsylvania, New York City, Oct. 23-24-25.

Association of Official Agricultural Chemists, Annual Meeting, Raleigh Hotel, Washington, D. C., Oct. 30-Nov. 1.

National Paint, Varnish & Lacquer Association, Annual Convention, Hotel Fairmont, San Francisco, Oct. 31, Nov. 1-2.

Oil Trades Association of N. Y., Annual Banquet, Hotel Waldorf-Astoria, N. Y. City, Nov. 1.

Eastern Air Conditioning Conference, Lehigh Univ., Bethlehem, Pa., Nov. 10-11.

American Petroleum Institute, 20th Annual Meeting, Stevens Hotel, Chicago, Nov. 13-17.

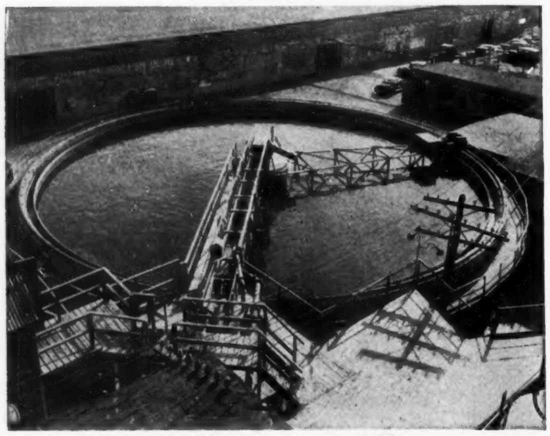
American Institute of Chemical Engineers, semi-annual meeting, Providence, R. I., Nov. 15-17.

Local

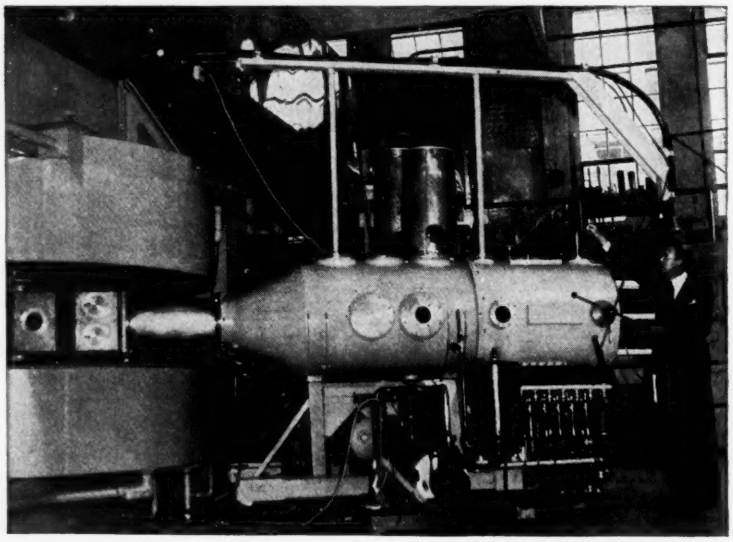
A. C. S., N. Y. City Section, Oct. 6.

life on the chemical newsfront

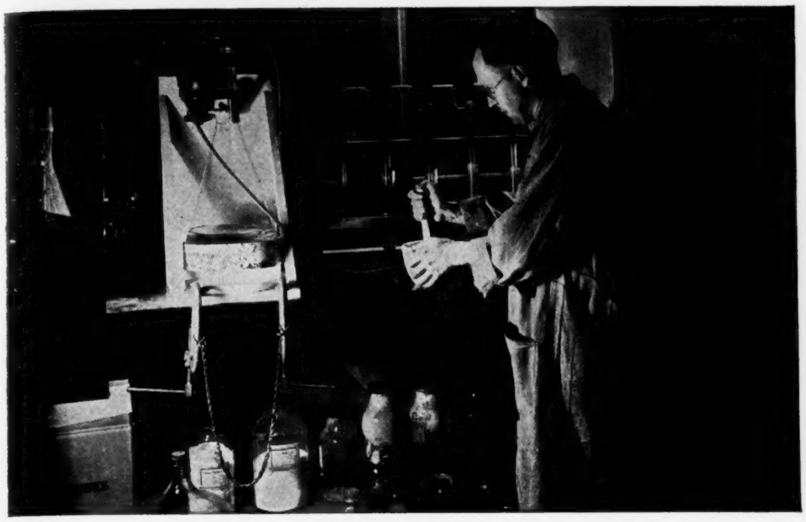
(*Above*) **SULPHUR**, one of the most difficult substances to wet, succumbs easily to the remarkable wetting power of AEROSOL† in a dilute solution in the beaker at left. Note how quickly and thoroughly the sulphur is wet, while plain water, at right, has no effect—as the sulphur will not sink, but floats on surface. One type of AEROSOL agent is a series of esters of sulfonated di-carboxylic acid, and another is an alkyl naphthalene sulfonate. They are used in many applications: adhesives, cosmetics, detergents, leather finishes, printing inks and many others.



(*Left*) **UNUSUAL CHEMICAL METAMORPHOSIS** takes place when Cyanamid, beginning with the slurry tank at top, utilizes by-products to make dense, tough, firesafe, synthetic gypsum products for the building industry. In the form of two-inch thick metalbound PLANK**, shaped like lumber and equivalent in insulating value to approximately ten inches of masonry, it is widely used for firesafe, roof-deck construction in industrial buildings. Strong and light in weight, it can be cut, sawed, nailed like wood, but unlike wood, it is rot-proof and termite-proof.

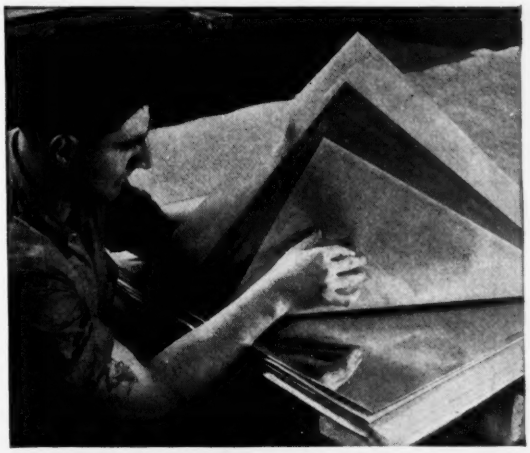


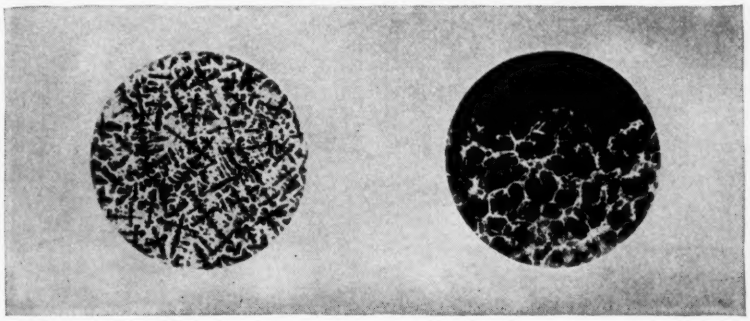
(*Above*) **GUN AND CHIEF GUNNER** are shown here as Dr. E. O. Lawrence, Director of the University of California's Radiation Laboratory, makes a final adjustment on the new 225-ton Cyclotron. In preliminary tests it produced a 16,000,000-volt beam of Deuterons—Atomic bullets with which science hopes to open new fields of research incalculable in value. Any one of the 92 chemical elements may be used as a target, and it has already been established that most of them become radio-active during bombardment.



(*Below*) **6 TONS OF PAPER** and 3,300 pounds of ink were used to print 60,000,000 copies of this new U. S. postage stamp commemorating the 25th anniversary of the opening of the Panama Canal last month. To the ink industry Cyanamid supplies many products, including resins, plasticizers, solvents; and for the paper manufacturer, Cyanamid is "Chemical Headquarters".

(*Above*) **IN THIS CHEMICAL PUNCH BOWL** are brewed RCA Kinescope screens on which television images are reproduced. Zinc sulphide, which has the property of fluorescing when struck by electrons, is one of the materials used in making Kinescope screens. Here zinc is being precipitated in the large, mechanically agitated flask. All chemicals used must be of highest purity, because, for example, the presence of as little as one part in 10,000,000 of copper in this luminescent material will result in green "ghosts" on the television screen.





(*Above*) **X-RAY MICRORADIOGRAPHY** is an advancement in present radiography technique, pioneered by University of Illinois' Professor G. L. Clark. This new development makes possible a clear delineation of grain boundaries and every type of inhomogeneity, such as the minutest traces of segregation of one metal in another. The photo at right shows white lines of copper in what was believed to be the homogeneous solid solution of an aluminum-copper alloy, while the left hand photo shows dark lines of lead in a leaded-bronze.

(*Right*) **WITH PAPER AND PLASTIC** one of the world's best known refrigerators saves space *and* increases thermal insulation. Fourteen paper sheets are impregnated with special Beetle* resin, laminated under 15,000,000 pounds pressure, formed into door panels. Through the use of this low-cost laminated Beetle plastic both thickness and weight of the door have been reduced. Beetle's waterproof surface resists impacts, defies nicking and scratches, is easy to keep spotless and retains its silky lustre a long, long time—all points which help sell the consumer. Can you use it?

American Cyanamid & Chemical Corporation

30 ROCKEFELLER PLAZA, NEW YORK, N. Y.

†Trade-mark of American Cyanamid & Chemical Corporation applied to wetting agents of its own manufacture. *Trade-mark of American Cyanamid Company applied to urea products manufactured by it. **The term PLANK as applied to cementitious building products is a trade-mark of the American Cyanamid & Chemical Corporation.

DU PONT
REG. U.S. PAT. OFF.

continuity

1802

what it means to you

THE 137 continuous years of chemical manufacturing have identified the du Pont Company as a dependable source of supply for chemicals and chemical products. Basic industries as well as highly specialized manufacturers have been helped in their progress toward reduced costs and improved products by the Company's broad research program for the production of materials which are cheaper, better and more easily utilized. The many customers and firm friends, made and retained through the years, are the conclusive evidence of this policy.

That many millions of dollars of du Pont chemicals are sold, and used annually, is an expression of confidence and satisfaction in the company, its representatives, its management, the quality of the products and the service which was rendered. It is a confidence in the mature experience and reliability of the du Pont Company . . . an endorsement of its continuous and far reaching program of research which is constantly seeking to improve products and to create new chemicals for industry.

You, as a consumer of chemicals, are more concerned with the total cost per unit of finished saleable products than with the cost per pound of the chemicals used in making or processing the product. Your manufacturing program and profits are founded on the assurance of a steady supply of chemicals which meet your specifications or requirements.

Through continuity of research and manufacture du Pont has contributed its share of such chemicals for practically every industry and with them the skilled technical assistance which has helped many manufacturers to reduce processing time, improve their methods and lower their costs.

DU PONT

R. & H. CHEMICALS

NON-FLAMMABLE SOLVENTS . . CERAMIC DECORATIONS
PEROXIDES . . PLATING CHEMICALS . . SODIUM, 99.9%
DRY-CLEANING FLUIDS . . REFRIGERANTS . . CYANIDES
FORMALDEHYDE . . AND . .
CHEMICALS FOR ALL INDUSTRIES

DU PONT
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E. I. DU PONT DE NEMOURS & COMPANY, INC.
The R. & H. Chemicals Department
Wilmington, Delaware
District Sales Offices: Baltimore, Boston, Charlotte, Chicago, Cleveland, Kansas City, Newark, New York, Philadelphia, Pittsburgh, San Francisco

"*Mamma, I just want you to know how much I appreciate your driving me back and forth from school every night.*"

Many people appreciate, too, the high quality
and uniformity of

NIAGARA CAUSTIC SODA

That goes for Niagara Caustic Potash and Carbonate of Potash, also.

TWO SILVER JUBILEES

CHEMICAL INDUSTRIES AND EXPOSITION BORN IN 1914

World War Caused Shortage Crises 25 Years Ago; American Chemical Industries Now Independent for Materials and Processes.

Twenty-five years ago, the idea of an Exposition of Chemical Industries was conceived. Twenty-five years ago, CHEMICAL INDUSTRIES made its first appearance as a weekly magazine devoted to current prices of drugs and chemicals.

Both were originated for the benefit of the American chemical industry, and it is no coincidence that both had their conception in the same year.

That year was 1914—and the significance of that date is made clear by the following quotations from the first issue of the precursor of CHEMICAL INDUSTRIES:

"The European war has created unprecedented conditions in the drug and chemical markets."

"German Drugs Indispensable—No other nation is able to continue its medical and hospital services uninterrupted without supplies from Germany."

"Can American chemists and chemical manufacturers undertake the manufacture of aniline dyes along the same lines and to the same extent that it has been carried on in Germany?"

In a word, the American chemical industry faced a crisis in 1914. Thousands of American manufacturers were suddenly cut off from the sole source of many essential chemicals, and few of them believed American chemical industries would ever be able to supply their needs.

FIRST EXPOSITION SHOWED OUR RESOURCES

The first Exposition of Chemical Industries was the chemical industry's reply to these doubts.

Many still remember the effect of this reply upon the nation. The Exposition was, literally, a revelation of unsuspected power, and served, as nothing else could, to inspire confidence in the ability of the American chemical manufacturer to serve American industry.

This confidence was justified. Soon, urgently needed chemicals were being supplied from American sources, and, in time, the United States became chemically independent of every other nation.

This progress, once started, never halted. Today, this country is the largest and most important producer of chemicals in the world.

The Expositions held since that time have not only been milestones of this progress; in addition, each one stimulated the industry to new research and new accomplishment.

New Business Magazine Meets Need for Market Data

In the beginning, the magazine which later became CHEMICAL INDUSTRIES devoted itself to the task of keeping the chemical industry in close touch with rapidly changing prices, reporting developments that affected supply or demand, and furnishing other essential economic information.

This service was one of the most important that could be rendered at the time, but, as conditions changed and the industry expanded, the need for other special services became apparent. CHEMICAL INDUSTRIES undertook to render these also.

Chemistry's Own Business Magazine

Today, CHEMICAL INDUSTRIES occupies a unique position in the chemical field.

.. It is, primarily, a tool for the use of the executive who must know what is happening and what is likely to happen wherever chemicals are being made or used.

.. It is chemistry's business magazine, the interpreter of the economic phases of the industry.

.. It is a news magazine, reviewing each month the important events that have taken place in the chemical field.

.. It is a guide to better practice, covering all developments that make for more efficient plant operation and production.

.. It is a thesaurus of new chemicals, keeping both the research worker and the chemical consumer fully informed of the new compounds available for their use.

.. It is a readable magazine, edited with the knowledge that few in the chemical industry have a complete technical understanding of the details of every branch of the industry.

THE NOVEMBER SILVER ANNIVERSARY NUMBER . . . PRACTICAL PLANT OPERATION

Will contain a notable series of articles on chemical plant operation, maintenance and administration by recognized authorities on these subjects. This issue will be of great interest to operating men actually engaged in making or using chemicals.

IN CHEMICAL INDUSTRY

MONTHLY COVERAGE OF CHEMICAL FIELD

Besides a number of special articles of timely interest, the reader will find the following subjects treated in every issue of CHEMICAL INDUSTRIES:

.. Plant Operation and Management
.. New Equipment
.. New Chemicals for Industry
.. Chemical Specialties
.. New Trade Marks of Chemical Products
.. Current Prices of nearly 2000 chemicals
.. News Review of the Month
  Company News
  Men of the Industry
  Heavy Chemicals
  Fine Chemicals
  Solvents
  Coal Tar Chemicals
  Oils and Fats
  Pigments and Fillers
  Raw Materials
  Agricultural Chemicals
  Specialties
.. Chemical Photo News, in rotogravure

STATISTICAL AND TECHNICAL DATA SECTION

Each issue also contains a separate Statistical and Technical Data Section which contains information that many executives declare to be invaluable. This information includes:

.. State of Chemical Trade
  Weekly and monthly business statistics
  Industrial trends
  Conditions in general business and the leading industries
.. Chemical Finances
  Earnings statements
  Annual reports
  Financial news
  Price trend of chemical securities
  Dividends and dates
  N. Y. Stock Exchange quotations
.. Analysis of the Past Year's Business of Important Groups of Chemical Products, such as paints and varnishes or fats and oils
  Sales
  Exports
  Employment Data
  Prices
  Business trends

This information is made doubly valuable by the manner in which it is classified and indexed.

SPECIAL ISSUES WILL MARK ANNIVERSARY

It is fitting that these two 25th Anniversaries—that of the Chemical Exposition and that of CHEMICAL INDUSTRIES—be celebrated in some way that will materially assist the progress of the American chemical industry.

To this end, CHEMICAL INDUSTRIES will publish two Silver Anniversary Issues, one in November and one in December, each of which will cover exhaustively a subject of outstanding importance to the industry.

The November Silver Anniversary Issue will be devoted to Chemical Plant Operation, Maintenance, and Administration.

The December Silver Anniversary Issue will be devoted to New Chemicals for Industry. These new chemicals will be exhibited by CHEMICAL INDUSTRIES at the Exposition.

TWO-YEAR PROGRESS THEMES OF DISPLAY

One of the focal points of interest at the 1939 Exposition of Chemical Industries for chemical plant executives, research directors, engineers, and other key men of the chemical industry, will be CHEMICAL INDUSTRIES' exhibit.

Here there will be on display hundreds of chemicals developed since the 1937 Exposition.

Some of these have already found widespread uses and are being manufactured in large quantities; some of them are so new that no one yet knows how far reaching may be their importance to industry. All, however, will be of interest to those to whom a new chemical means a new product to market, a new method of processing, or a new tool for research.

All of these new chemicals will be so displayed that they can be examined by anyone interested.

Everyone engaged in the manufacture or use of chemicals will be welcomed at CHEMICAL INDUSTRIES' exhibit, and those in charge will be glad to render any possible service to visitors.

The December Silver Anniversary Issue of CHEMICAL INDUSTRIES will be out during the week of the Exposition and copies can be secured at CHEMICAL INDUSTRIES' exhibit.

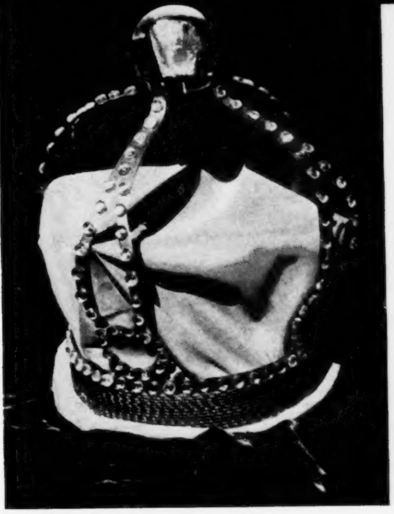
THE DECEMBER SILVER ANNIVERSARY ISSUE . . . NEW CHEMICALS FOR INDUSTRY

Will list hundreds of chemicals developed in the past two years and describe their properties and uses insofar as these are known. New chemicals that have assumed special importance will be fully discussed in articles by those who developed them.

CHEMICAL INDUSTRIES

The Chemical Business Magazine

Established 1914



The All-Dow Crown, exhibited at the recent Dow Field Day—made of "Etheron" and "Styron" vinylidene chloride plastics.

Wall Street's Chemical Valuations

CHEMICAL securities are at the moment a sort of fad of Wall Street which regards them as "good bets for a short run." This opinion is translated tangibly into the comparatively high price of most chemical stocks based upon their earnings' record. This is not an unmixed blessing, for this flattering opinion is not always based upon a sound conception of what the chemical industry's position really is.

To the outsider chemical operations are always mysterious and never easy to understand. There is still a good deal of the rabbit-out-of-the-hat notions in the popular conception of our chemical progress, and we must admit that there is very little appreciation of the fact that this industry is old established and firmly founded.

There has been so much ballyhoo of research and it has been so very easy to get a newspaper story every time a new smell emanates from a research laboratory that it is small wonder the layman regards the chemical industry as a sort of scientific bonanza. The more hard-headed financier accuses us of destroying values by our inordinate progress and our resulting extraordinary obsolescence.

A fact easily overlooked even by ourselves is that the foundations of this industry are laid down in big-tonnage, industrial raw materials sold on the "salt and sugar basis." In these chemical staples there is no more than a satisfactory manufacturing profit; but the demand for them is at once steady and constantly increasing. The alkalies, the acids, the alums: these are the three big A's of chemical trade. While our production of them has roughly doubled in the past twenty years, it is nearly fifty years since there has been any radical change in their methods of production. This is an extraordinarily significant fact that Wall Street apparently does not know or fails to appreciate.

Upon this rock-ribbed foundation our chemical industry is built firmly. The basis of our great chemical advancement from the industrial viewpoint is not the development of new wetting-out agents or novelties in leather finishes, but the fundamental fact that all industries are today increasing users of our basic chemicals. There are more chemicals in rayon than in cotton, more in a lacquer than in a paint, more in a plastic than in a metal; and as these new synthetics extend their market the underlying chemical consumption geometrically increases.

It is a dis-service to us all to advertise the frosting and ignore the cake. It would be a great service, if the country at large could be enlightened intelligently on the real character of this industry's development during the past 200 years, and the real meaning of our present progress.

Editorial

Far-West Chemicals From beans to beer and from welding to waste, the ways and means in which industrial chemistry may develop the vast natural resources of the Far-West were discussed at the Western Chemical Congress held in San Francisco last month. Unfortunately for the prestige of our Pacific Coast States, the phenomenal chemical plant construction in the South and Southwest in the last few years has somewhat overshadowed the developments in the Far-Western States.

Frankly, the recent Congress had as its primary objective the focusing of the attention of the entire country on the wealth of natural raw materials on the one hand, and a rapidly expanding consumer demand in the region between Seattle and San Diego on the other. The demonstrated existence of both is likely to attract capital to any area, provided other factors, such as taxes, labor, power costs, etc., also are favorable.

Particularly thought provoking was the question posed by William C. McIndoe, consulting chemist, why the Pacific Coast has yet to secure a branch rayon plant, an industry which has expanded through both depressions. According to him the Pacific Coast can supply all the raw materials and chemicals needed, irrespective of the rayon process chosen, at prices at or below New York levels; also, that the existence of cheap fuels and power possibly could increase the investment return over that obtained in the East by as much as fifteen per cent.

To answer the problem of distance from markets, he pointed out the vast market in Los Angeles for rayon cord for automobile tires and also insisted that big water shipments via Panama Canal can reach existing Eastern markets at a profit.

Quite naturally, the extensive Western phosphate reserves and their possible commercial development received considerable attention at the Congress. Definitely linked, however, with the utilization of these beds and indeed of the utilization of the vast forest resources for rayon or plastics production, is the question of power.

Admittedly large quantities of power are now available for all kinds of industries, including the chemical field, at Boulder Dam and at the Columbia River projects, but fear of government competition with private enterprise in these very sections is currently a strong deterring factor. Added to this fear is a strong belief in the East that labor conditions on the Pacific Coast are unfavorable. Millions poured into hydro-electric developments will not develop the Far-West industrially until certain New Deal policies are changed. The whole question is more political than chemical.

Fluorine to the Fore Chemical developments often come in groups and for very obvious reasons. The last couple of years, as an example, have witnessed a number of exceedingly significant developments in the field of phosphorus. A few years ago we witnessed a similar outburst of activity in ethylene and amyl derivatives. An observing reader of chemical literature must have noted recently an unwonted activity in fluorine compounds.

This fluorine development traces back, of course, to a more efficient commercial production of this element and an improved technique in handling it with the result that it is naturally attracting the attention of research staffs. The first important new development was the Du Pont refrigerant, dichlorodifluoromethane. In Germany the Hochst Works have put upon the market a range of fluorinated diazo dyes of orange to scarlet shades and exceedingly fast to light which contain the trifluoromethyl group. Fluorinated stearic acid has been developed in France with a bacterial action at least equal to the copper compounds used as orchard insecticides. Plastics are being produced from aliphatic fluorine derivatives.

Quite quickly a valuable store of practical fluorination methods, comparable but often quite dissimilar to the familiar chlorination operations, is being built up. We may expect confidently the development that there will follow, not only of new dyes and new insecticides, but also new aromatics and medicinals as a result of this research activity.

Quotation Marks

Our hope is that our numerous friends and associates in Tennessee will never be required to defend a business of their own against government subsidized competition.—Wendell L. Willkie, president, The Commonwealth & Southern Corporation.

NAVAL STORES

1919—1939

By Dr. Eldon Van Romaine

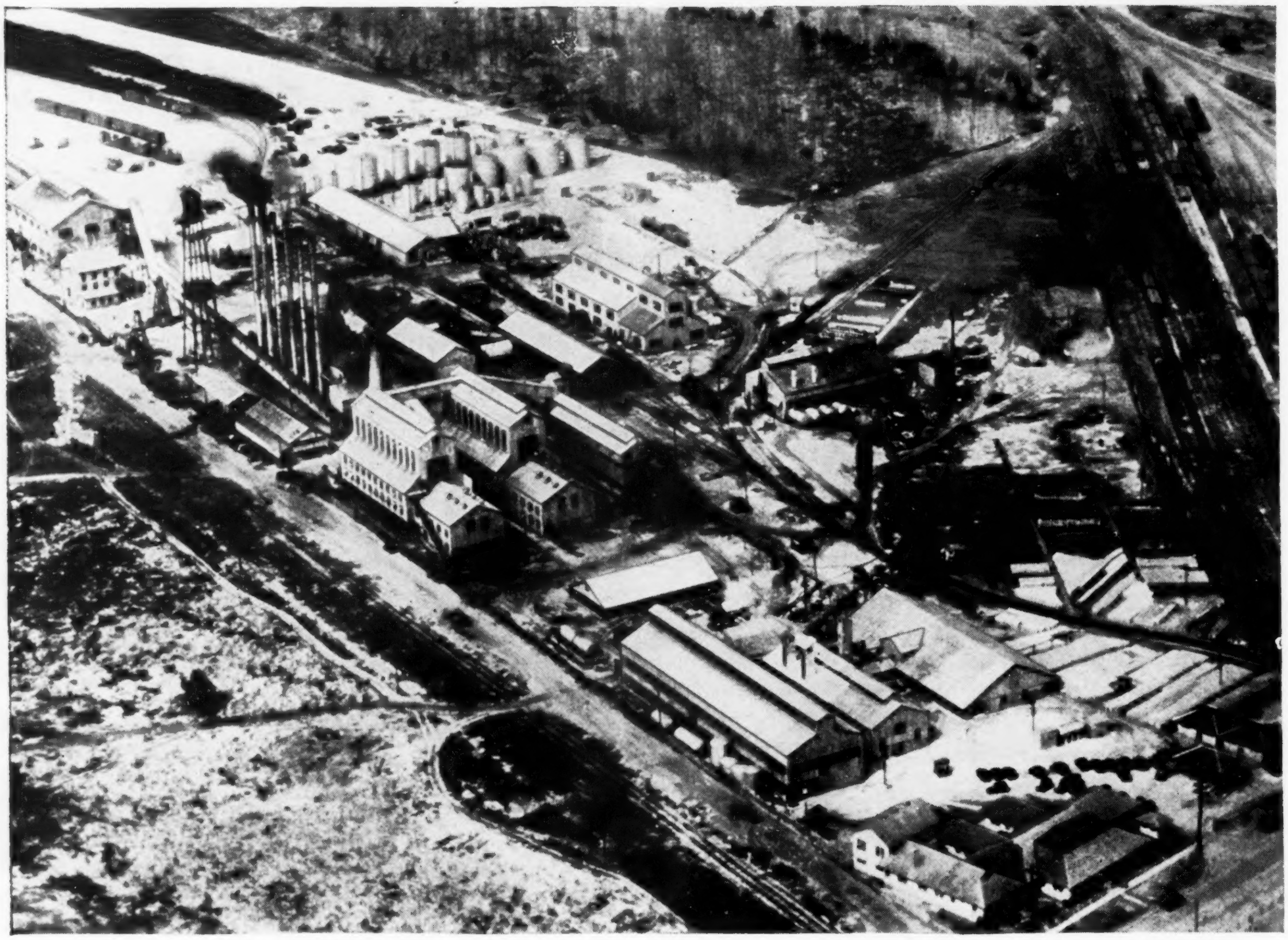
THROUGHOUT the years the term "Naval Stores" has been used when referring to a variety of products. In the early Colonial days most commodities, as corn, tobacco, timber, tar, pitch, turpentine and rosin, which were shipped to the ports and exported were called Naval Stores, but in time this custom gradually changed and only tar, pitch, turpentine and rosin retained this distinction. It is presumed that the principal reason why these products alone remained classified or identified as Naval Stores is that all, except rosin, were used in quantity in the construction and repairing of wooden ships. In general, the term "Naval Stores," as it is used today, refers to all of the products, (as is or modified), which are produced from the gum obtained by tapping the living pine tree, by solvent extraction, steam distillation or destructive distillation of the green or dead pine wood. The Naval Stores Act, an Act establishing standard grades of Naval Stores, preventing deception in transactions in Naval Stores, regulating traffic therein and for other purposes, which was approved on March 3rd, 1923 and became effective on March 1st, 1924, defines Naval Stores as Spirits of Turpentine and Rosin.

Pine tar, pitch and some turpentine were produced in several of the European countries, Poland, Russia, Norway and Sweden, many years before they were made in the Western Hemisphere. However, the industry in Europe did not become an important producer of turpentine and rosin until after the turn of the present century. It is believed that turpentine was first produced in America in 1606, for, according to Williamson's "History of Maine," turpentine was made by the French at Port Royal Annapolis, Nova Scotia, in that year and, insofar as it is known, this is the first recorded date with reference to the production of turpentine on this Continent. From the most authentic information available, turpentine, tar and pitch were first produced in the United States in 1608 at Jamestown, Va. That year, therefore, marks the beginning of the industry in the United States and makes the Naval Stores Industry in this country three hundred and thirty-one years old this year of 1939.

The making of tar and pitch in Virginia was of short duration and it was not until about 1642 or shortly thereafter that the industry became established on a sound and profitable basis in the United States. This first successful development took place in the New England States along the Connecticut River. Here the industry prospered and in a relatively short time it became one of the most important industries in this section, but because of the rapid destruction of the pine tree, which brought about the enactment and enforcement of rigid conservation laws by Massachusetts, it was virtually forced to discontinue operations in this colony in or shortly after 1715. However, this situation had not

BECAUSE tar, pitch, turpentine and rosin were almost exclusively used in the construction and repair of wooden ships, they were called "Naval Stores." The technical director of the General Naval Stores Division of Newport Industries, vividly explains in great detail how intensive research has revivified an old and important American industry.

The two sources of naval stores—left, pine stumps; right, the sap from the pine tree.



The Pensacola, Florida, Naval Stores Plant of Newport Industries, Inc.

been entirely unforeseen and from the New England States the industry had been slowly moving southward, where it became established first in North Carolina about 1710 to 1715. In this new region, where immense forests of pine, very rich in resinous materials were located, the industry developed very rapidly and within a comparatively short time after tar and pitch were first made in this section, the United States became the principal Naval Stores producing country in the world, which position it still maintains.

North Carolina, for nearly 150 years or until about 1880, was the principal source of Naval Stores. During the period 1880-1890 South Carolina assumed the leadership and in 1891 Georgia produced approximately 53 per cent. of the country's total volume. Georgia continued to produce the highest percentage until 1906 when it was superseded by Florida in which state the production reached a peak of 1,082,000 barrels (500 lbs.) of rosin and 340,500 barrels (50 U. S. gals.) of turpentine in 1908. In 1923-24 Georgia again became the principal producing state which distinction it has retained to date.

In Alabama, Louisiana, Mississippi and Texas, Naval Stores have been produced for many years and in the years 1914-15 to 1919-20 inclusive, the combined production of these states averaged approximately 42.5 per cent. of the country's total volume of gum rosin and turpentine.

The production of gum rosin and turpentine by states for the seasons 1918-19, 1927-28 and 1937-38 expressed in terms of per cent. of the total volume of these products was approximately:

State	*1918-19*	*1927-28*	*1937-38*
North Carolina	0.27%		0.15%
South Carolina	0.21%	3.85%	2.90%
Georgia	19.35%	46.31%	57.06%
Florida	37.17%	32.15%	26.39%
Alabama	12.22%	6.92%	9.65%
Mississippi	9.79%		3.08%
Louisiana	14.83%		0.40%
Texas	6.16%		0.37%

The increase in production which has taken place in Georgia during the past twenty years, due primarily to the excellent stands of second growth pine which have developed since about 1900 over a very large cut-over area, is of particular interest because it quite definitely indicates the possibilities which might be achieved through the adoption of a well planned and active reforestation program.

The production of gum rosin and gum turpentine reached its greatest volume in the United States in the season 1908-09 when 750,000 barrels (50 U. S. gals.) of turpentine and 2,500,000 barrels (500 lbs.) of rosin were made. From a maximum of 3,250,000 packages, the production gradually decreased and in 1918-19 it

amounted to a total of only 1,472,000 packages. This volume is the smallest recorded for any season from 1900-01 to 1937-38 inclusive. Since 1919-20 to and including 1937-38, the production has fluctuated between a total of 1,948,000 and 2,815,000 packages.

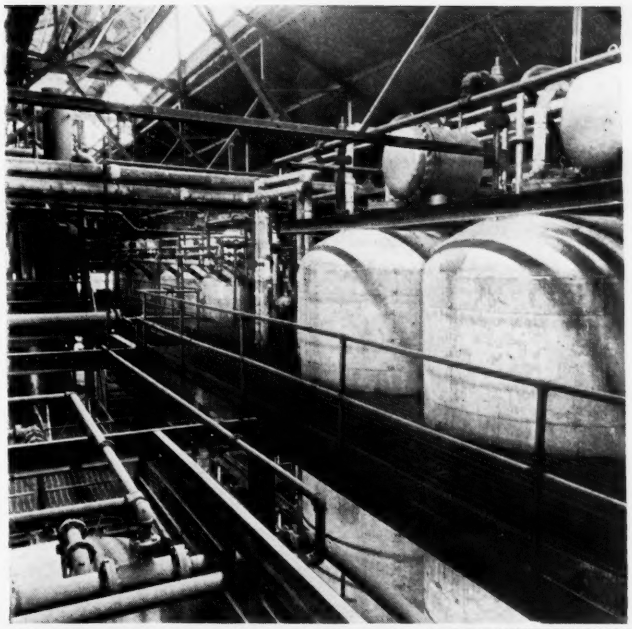
Production of Gum Rosin and Gum Turpentine in the United States Each Year 1918-19 to 1937-38 Inclusive

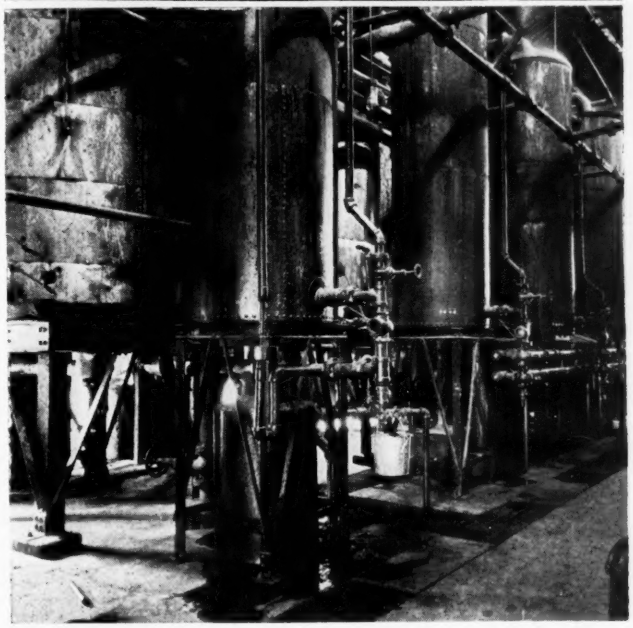
Year	*Rosin (bbls. 500 lbs.)*	*Turpentine (bbls. 50 U. S. gals.)*
1937-38	1,681,000	505,000
1936-37	1,631,000	490,000
1935-36	1,700,000	510,000
1934-35	1,665,000	500,000
1933-34	1,631,000	490,000
1932-33	1,498,000	450,000
1931-32	1,665,000	500,000
1930-31	2,000,000	600,000
1929-30	2,081,000	625,000
1928-29	1,865,000	560,000
1927-28	2,165,000	650,000
1926-27	1,700,000	510,000
1925-26	1,600,000	480,000
1924-25	1,765,000	530,000
1923-24	1,881,000	565,000
1922-23	1,731,000	520,000
1921-22	1,665,000	500,000
1920-21	1,748,000	525,000
1919-20	1,332,000	400,000
1918-19	1,132,000	340,000

As the center of the industry shifted from one state to another, corresponding changes took place with respect to the principal trading centers and ports. Wilmington, N. C., was the first to come into prominence as a Naval Stores port. When South Carolina was the principal producing state, Charleston became an important port and during the first period of Georgia's supremacy as a producing state, Savannah rapidly developed as a trading center and in a relatively short period it became the leading Naval Stores port and market of the world. In 1896-97 the receipts of rosin and turpentine at Savannah totalled 1,640,495 packages. Jacksonville in 1915-16 acquired the distinction of being the most important port and market, but Savannah regained the leadership in 1924-25 and still maintains this position. While Savannah and Jacksonville are the two principal ports and markets in this country, Pensacola, Fla., Brunswick, Ga. and Mobile, Ala., are important storage centers.

When the industry was being established in the South, quite large domestic and foreign markets existed for tar and pitch. To supply these markets the industry developed quite rapidly, but its greatest rate of expansion did not take place until some time after 1850. At about that time the demand for rosin and turpentine began to increase and, shortly thereafter, these materials became the principal Naval Stores products.

In 1720, approximately 6,000 barrels of tar and pitch were made. In 1753 the production amounted to about 84,000 barrels of tar, pitch and crude gum and in 1850,





Above, the top section of a battery of earth filters in the pale rosin building of Newport; center, top section of a battery of retorts or extractors in the retort building; below, battery of steam stills and condensers in the refinery.

nearly one hundred years later, 618,000 barrels of tar, pitch, turpentine and rosin were made. During the period 1870 to 1890 the consumption of turpentine and rosin started to increase at an accelerated pace and in order to meet the mounting demand for its products, the industry increased its production at a rate which in 1900 amounted to 620,000 barrels (50 U. S. gals.) of turpentine and 2,065,000 barrels (500 lbs.) of rosin and in 1908-09 a total of 3,365,000 packages. From the high of that year, the total annual production of the industry, including the production of steam distilled wood turpentine and wood rosin on and after 1910, gradually decreased and in 1918-19 it amounted to a total of only 1,601,000 packages. Beginning with the next season, the production again started an upward climb and reached an all time peak in 1927-28. The total volume for that year was 3,307,000 packages. For the seasons 1930-31 to and including 1937-38 the total annual production has fluctuated between 2,367,000 and 3,121,000 packages or an average of 2,788,000 packages.

Estimated Total Annual Production of the Industry in the United States 1918-19 to 1937-38 Inclusive

Year	*Rosin (bbls. 500 lbs.)*	*Turpentine (bbls. 50 U. S. gals.)*
1937-38	2,382,000	645,000*
1936-37	2,318,000	603,000
1935-36	2,275,000	608,000
1934-35	2,174,000	585,000
1933-34	2,118,000	575,000
1932-33	1,854,000	513,000
1931-32	1,979,000	557,000
1930-31	2,439,000	682,000
1929-30	2,548,000	717,000
1928-29	2,297,000	645,000
1927-28	2,574,000	733,000
1926-27	2,065,000	587,000
1925-26	1,885,000	544,000
1924-25	2,023,000	591,000
1923-24	2,083,000	612,000
1922-23	1,897,000	553,000
1921-22	1,717,000	509,000
1920-21	1,837,000	541,000
1919-20	1,447,000	421,000
1918-19	1,242,000	359,000

*Includes an estimated production of sulfate wood turpentine of 25,000 bbls.

Exports of Wood and Gum Rosins and Turpentine for Each Year 1918-19 to 1937-38 Inclusive. Also the Ratio of Total Exports to Total Production Expressed in Terms of Per Cent.

Total Exports.

Year	*Rosin (bbls. 500 lbs.)*	*Per cent. of Production*	*Turpentine (bbls. 50 U. S. gals.)*	*Per cent. of Production*
1937-38	1,034,522	43.00%	276,530	43.00%
1936-37	1,099,439	43.00	271,368	45.00
1935-36	1,204,441	53.00	224,385	37.00
1934-35	1,057,369	49.00	207,285	35.00
1933-34	1,199,635	57.00	300,199	52.00
1932-33	1,089,249	59.00	225,056	44.00
1931-32	1,119,635	57.00	253,907	46.00
1930-31	1,219,388	50.00	327,312	48.00
1929-30	1,365,807	54.00	338,812	47.00
1928-29	1,278,813	56.00	275,926	43.00
1927-28	1,373,006	53.00	329,910	45.00
1926-27	1,129,614	55.00	255,897	44.00
1925-26	1,083,131	57.00	227,230	42.00
1924-25	1,463,148	72.00	249,703	42.00
1923-24	1,170,160	56.00	224,568	37.00
1922-23	950,000	50.00	170,000	31.00
1921-22	675,000	33.00	210,000	41.00
1920-21	508,000	30.00	174,000	32.00
1919-20	730,000	50.00	214,000	51.00
1918-19	502,000	40.00	83,000	23.00

Exports to

	Europe		*South America*		*Other Countries*	
Year	*Rosin (bbls. 500 lbs.)*	*Turpentine (bbls. 50 U. S. gals.)*	*Rosin (bbls. 500 lbs.)*	*Turpentine (bbls. 50 U. S. gals.)*	*Rosin (bbls. 500 lbs.)*	*Turpentine (50 U. S. gals.)*
1937-38	579,634	208,081	166,321	11,528	288,567	56,921
1936-37	627,161	210,243	142,317	10,369	329,960	50,756
1935-36	724,977	172,850	168,295	9,139	311,169	42,396
1934-35	613,847	158,425	126,329	7,963	317,193	40,897
1933-34	727,942	250,435	177,166	8,417	294,527	41,247
1932-33	665,689	180,452	180,119	8,094	243,441	36,510
1931-32	632,586	201,359	190,866	11,361	296,242	41,187
1930-31	711,313	269,894	227,519	14,055	280,556	43,365
1929-30	853,992	270,054	226,361	20,166	285,524	48,592
1928-29	750,418	211,757	246,717	19,119	286,678	45,050
1927-28	857,482	259,296	256,234	20,105	259,290	50,509
1926-27	656,315	189,853	211,843	20,920	261,456	45,124
1925-26	637,247	170,882	217,281	15,263	228,603	41,085
1924-25	905,482	194,380	264,641	17,490	293,025	37,833
1923-24	698,001	164,899	243,058	18,290	229,101	41,379
1922-23	539,000	119,000	215,365	12,999	195,635	38,000
1921-22	305,000	163,000	204,650	12,754	165,350	34,246
1920-21	240,000	115,000	146,534	22,505	121,466	36,517
1919-20	301,000	158,000	203,589	18,914	225,411	37,086
1918-19	205,000	18,000	135,135	18,195	161,865	46,805

The world markets have always been of prime importance to the Naval Stores industry in this country. They are as important today as they have been in the past, and they must continue to be of extreme interest in the future if the industry is to maintain its present position as a profitable source of valuable, low cost, raw materials.

When tar and pitch were the paramount products, the major portion of the annual production was exported. However, foreign shipments of turpentine and rosin were inconsequential until about 1830 when they amounted to a total of 94,000 packages. From that year the exports began to increase very rapidly and continued to do so until they reached an all time top of 1,580,000 barrels (500 lbs.) of rosin in 1901 and 416,000 barrels (50 U. S. gals.) of turpentine in 1912.

A relatively high percentage of the annual production is still exported, but the trend of the ratio of exports to production as well as the total volume of exports has been definitely downward, particularly during the last 13 years. During the period 1901-02 to 1913-14 inclusive, the average annual exports were 355,000 barrels (50 U. S. gals.) of turpentine and 1,384,000 barrels (500 lbs.) of rosin or approximately 64 per cent. of the total production, whereas the average for each season from 1925-26 to 1937-38 inclusive was 270,000 barrels (50 U. S. gals.) of turpentine and 1,173,000 barrels (500 lbs.) of rosin or 49 per cent. of the total production. While the exports of both turpentine and rosin were less during the latter period than they were during the former, the decrease, however, was not the same for each product. For turpentine it amounted to approximately 24 per cent. and for rosin it was 16 per cent.

Status of Foreign Shipments

There are several causes for this decline in foreign shipments, but perhaps the two most important are—World political conditions and a world-wide decrease in the consumption of turpentine by the paint and varnish industry. The former has been more or less responsible for the decrease in the consumption of both rosin and turpentine in certain countries through an enforced substitution of domestically produced materials for the imported products and an increase in the production of Naval Stores in other countries due to some favored nation policy or barter agreement. The very sharp decline in the annual exports of rosin to Germany and Italy which has taken place during the past few years is, therefore, of particular interest since it indicates the effect these conditions have on foreign trade. The average annual volume of rosin shipped to Germany from 1924 to 1933 inclusive was approximately 250,000 barrels (500 lbs.); from 1934 to 1938 inclusive the average amounted to approximately 160,000 barrels (500 lbs.), a decrease of 36 per cent. The total rosin shipments to Germany for the season 1937-38 were only 88,143 barrels (500 lbs.) and this volume is the lowest for any year except the World War years and 1919-20, 1920-21, since 1900.

The Naval Stores industry in the United States was the first to produce gum rosin and turpentine in quantity. In France, the industry began very early in the 19th century. In 1848 the first trees were tapped in Spain and at about that same time, the first attempt to produce turpentine and rosin was made in Germany. The industry in Russia began making these products in 1870, Finland began in 1871 and Greece began about 1902. Prior to 1900, the production in foreign countries, except France, was relatively small but since that year it has steadily increased. In 1908-09 the principal producing countries, other than the United States, were France, Spain, Portugal and Greece and their combined production was about 195,000 barrels (50 U. S. gals.) of gum turpentine and 684,000 barrels (500 lbs.) of gum rosin. In 1921-22 the estimated production of these countries and that of Mexico, India and Austria was 227,000 barrels (50 U. S. gals.) of gum turpentine and 758,000 barrels (500 lbs.) of gum rosin. Since 1921-22, the Naval Stores industry has become more or less established in a number of other countries and the volume of this recently developed source, together with the increase in production which has taken place in some of the former producing countries, has not only increased the total foreign production but it has also caused a decrease to take place in the ratio of the United States' total production, wood and gum, to the world's production.

Estimated Total Annual World Production of Wood and Gum Rosin and Turpentine Also the Annual Production in the United States in Relationship to the Total World Production Expressed in Terms of Per cent.

1921-22 to 1937-38 Incl.

Year	*Rosin (bbls. 500 lbs.)*	*Turpentine (bbls. 50 U. S. gals.)*	*Production in U. S. % World Total*
1937-38	3,868,000	1,059,000	61.00%
1936-37	3,647,000	997,000	65.00
1935-36	2,911,000	792,000	77.00
1934-35			
1933-34			
1932-33	2,809,000	764,000	66.00
1931-32	2,864,000	816,000	69.00
1930-31	3,476,000	987,000	73.00
1929-30	3,514,000	1,000,000	72.00
1928-29	3,329,000	947,000	69.00
1927-28	3,566,000	1,024,000	72.00
1926-27	3,048,000	807,000	69.00
1925-26	2,725,000	791,000	69.00
1924-25			
1923-24			
1922-23	2,509,000	746,000	68.00
1921-22	2,509,000	746,000	68.00

Marketing Gum Naval Stores

Gum rosin and turpentine in this country are, generally speaking, sold by producers through factors to brokers, exporters or dealers, who in turn, sell direct or through other agencies to the consumer. The price of each product which is established daily by the Board of Trade at Savannah and Jacksonville is arrived at in the following manner:

Estimated 1937-38 World Production of Wood and Gum Rosin and Turpentine According to Countries

Country	*Rosin (Bbls. 500 lbs.)*	*Turpentine (Bbls. 50 U. S. gals.)*
United States	2,382,000	614,000
France	450,000	135,000
Spain	164,000	49,000
Portugal	217,000	65,000
Greece	107,000	32,000
Mexico	83,300	25,000
India	29,000	8,700
Austria	21,700	6,500
Russia	267,000	80,000
Poland	83,300	25,000
Sumatra	15,000	4,500
Germany	16,700	5,000
Miscellanous	31,000	9,300

NOTE: The estimated production of Sulfate Wood Turpentine in 1937-38 was approximately 70,000 bbls. (50 U. S. gals.). This is not included in the above data.

At the trading hour, which in Savannah is 12 Noon, the factors, brokers and/or exporters meet in the board room and each factor posts his offerings for the day of turpentine and rosin. When the listing has been completed and the totals are determined, the chairman of the factors calls for sealed bids. When all of the bids have been deposited with him, he declares the bidding closed and then opens and reads the various bids aloud. As acceptances are declared, the sales are posted and the quotations committee, which consists of factors, brokers and/or exporters, after deciding on the tone of the market, advises the clerk of the official market which he immediately posts. Only transactions consummated between factors and brokers or exporters are considered by the quotations committee.

The Savannah Board of Trade, which is the leading Naval Stores market of the world and the daily quotations of which are accepted in all lands as a basis for trading in these commodities, received its first charter under the name of the Savannah Naval Stores Exchange in 1882. In 1883 the original charter was amended and the present name was established.

The prices of turpentine and rosin have at times fluctuated quite widely and as is the case with all other commodities, they have been very greatly influenced by the volume of production and/or general business conditions. The price trend of both products followed very much the same general pattern from 1900 to 1921, but since 1921, the price of each product has followed quite a different course. The principal reason why the price of turpentine has steadily declined from an all time high of $2.33 per U. S. gallon in Savannah in 1920-21 to $0.19¾ in 1937-38, the lowest point in 56 years or more, is that the paint and varnish industry throughout the world, which for many years has been the main turpentine consuming industry, has reduced its annual requirements for this product to a considerable extent in recent years, and no substitute market has as yet been created.

Rosin is used in the manufacture of a very large number of widely diversified products. In some, it is used as is, and in others, as a chemical raw material. The principal chemical uses for rosin are soap, paper size, ester gum, synthetic resins and metal resinates, and of the total annual world consumption of rosin about 75 per cent. or more is required in the manufacture of these products. Throughout the years a number of important changes have come about in the use of rosin and/or rosin products, as for example, rosin oil. The manufacture of rosin oil was one of the early large uses for rosin. Today, however, this use consumes but a fraction of its former requirements and a relatively small percentage of the world's total annual consumption. Soap, which was also one of the early uses for rosin, has maintained a high rate of consumption for many years and its position now is the same as it has been for a long period, namely, the world's largest single use for rosin. About 1820, rosin was first used for making paper size and the annual requirements for this use have steadily developed throughout the years. In this country at least, they are still increasing.*

* To be continued in the October issue.

Average Annual Quotations on Savannah Market of Gum Rosin and Turpentine—1918-19 to 1937-38 Incl.

Grade of Rosin (Standard Bbl. 280 Lbs. Gross)

Year	"B"	"D"	"E"	"F"	"G"	"H"	"I"	"K"	"M"	"N"	"WG"	"WW"	"X"	*Turpentine (U.S. Gals.)*
1937-38	6.23	6.25	6.38	6.83	6.85	6.90	6.90	6.93	7.00	7.05	7.45	8.03	8.03	$0.3025
1936-37	6.25	6.50	6.63	6.83	6.85	6.85	6.85	6.88	6.90	6.93	7.13	7.88	7.90	0.3850
1935-36	3.70	3.95	4.10	4.28	4.35	4.38	4.40	4.45	4.48	4.75	5.00	5.60	5.63	0.4375
1934-35	4.08	4.15	4.25	4.43	4.48	4.53	4.55	4.60	4.63	4.80	5.03	5.35	5.38	0.4750
1933-34	3.50	3.58	3.78	3.88	3.88	3.90	3.93	4.00	4.03	4.10	4.18	4.43	4.45	0.4450
1932-33	1.95	2.10	2.35	2.55	2.60	2.65	2.70	3.00	3.50	3.93	4.30	4.80	4.83	0.3900
1931-32	2.73	2.93	3.13	3.23	3.30	3.38	3.40	3.58	3.88	4.60	5.78	6.15	6.23	0.3850
1930-31	4.20	4.45	4.60	4.73	4.75	4.80	4.80	4.90	5.00	5.35	6.15	6.95	7.05	0.4050
1929-30	6.93	7.05	7.23	7.35	7.38	7.40	7.43	7.48	7.50	7.75	7.98	8.40	8.43	0.4875
1928-29	7.58	7.70	7.88	8.00	8.05	8.10	8.10	8.20	8.28	8.63	9.48	10.13	10.18	0.5100
1927-28	7.80	7.90	8.05	8.15	8.20	8.23	8.25	8.33	8.38	8.75	9.58	10.60	10.63	0.5200
1926-27	10.35	10.65	11.15	11.60	11.65	11.70	11.90	12.45	12.65	13.15	13.93	15.05	15.15	0.8050
1925-26	10.55	10.75	10.93	11.30	11.35	11.38	11.40	11.83	12.03	12.45	13.10	13.78	13.85	0.9650
1924-25	5.55	5.60	5.65	5.65	5.65	5.70	5.70	5.80	5.90	6.10	6.80	7.50	8.25	0.8250
1923-24	4.58	4.60	4.60	4.60	4.60	4.60	4.60	4.70	4.85	5.05	5.43	5.75	...	0.9800
1922-23	4.85	4.90	4.95	4.97	5.00	5.00	5.00	5.10	5.28	5.58	6.00	6.60	...	1.2250
1921-22	4.05	4.10	4.13	4.18	4.20	4.23	4.28	4.63	5.00	5.30	5.73	6.13	...	0.6700
1920-21	11.93	13.36	13.41	13.43	13.43	13.43	13.45	13.51	13.63	13.74	13.84	13.96	...	1.3200
1919-20	15.20	15.57	15.65	15.73	15.85	16.04	16.61	17.71	18.11	18.71	19.15	19.64	...	1.4200
1918-19	11.33	11.39	11.42	11.44	11.47	11.53	11.79	12.65	12.91	13.07	13.28	13.51	...	0.5900

Silver as a Raw Material

By Robert H. Leach

Robert H. Leach, vice-president of Handy & Harman and an international authority on the metal, in Part II, discusses in detail the industrial applications of silver, its use in the chemical and allied fields as a raw material and in the fabrication of chemical process equipment.

THE discovery of a successful method of electroplating silver was made in 1840 and the use of silver for this purpose has grown until several million ounces are used annually. The electrolyte or plating bath contains a double salt of silver cyanide with either sodium or potassium cyanide. Silver anodes are supplied in rolled plates of proper size, as cast anodes have not been satisfactory. The silver used must be free from impurities which will cause a black scum to form on the anode. As the thickness of this black deposit increases it will separate from the anode and may be carried to the articles being plated, thus destroying the work.

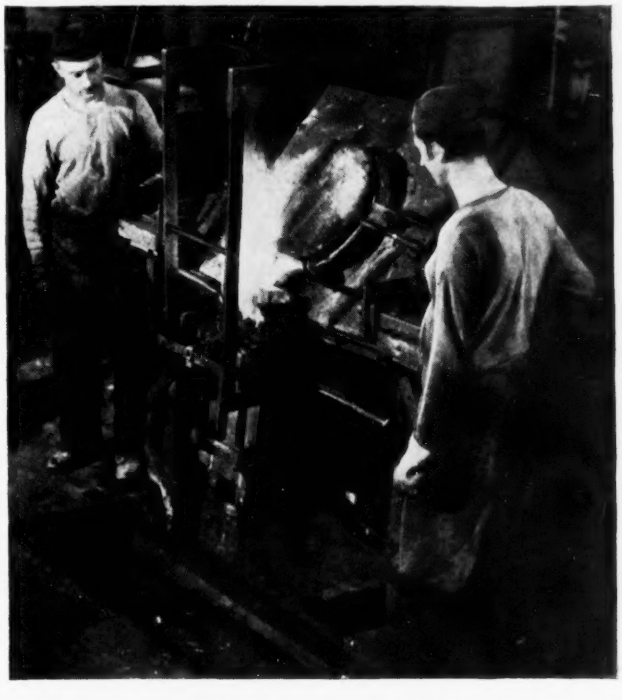
These anodes and the articles which act as cathodes to be plated are suspended in the plating bath and a direct current of one to three volts and approximately three to five amperes per square foot of anode surface deposits the silver from the anodes on the article.

By providing tanks of suitable size it is possible to electroplate silver on large surfaces but the principal use to date has been in the silver plating of tableware, cups, vases and other ornamental articles.

Before the electroplating process was discovered, the method of producing a fine silver plate on base metal consisted in making a duplex plate or double plate as it was sometimes called. These duplex plates are made by placing a relatively thin sheet of silver upon a heavier bar of base metal of the same size. In some cases a thin sheet of silver solder is placed between the silver and base metal. Flux is applied to the exposed edges to prevent oxidation and the assembled plates are heated to a bright red. By means of heavy clamps, rolling or hammering, the plates are forced together at this temperature and a strong bond is made between the silver and base metal. This duplex bar can then be rolled to any desired thickness or size and the thickness of the silver will bear approximately the same relation to that of the base metal as in the original assembly. By varying this ratio the desired thickness of silver in the finished plate can be obtained.

This method was used for producing the famous old Sheffield Plate in England, but since the discovery of electroplating it has been used principally for cladding base metals with binary and ternary precious metal alloys such as the karat gold alloys for example, which are extensively used in the jewelry industry and are sold under the classification of rolled or filled gold, and are difficult to produce by electroplating methods.

Recently there has been a renewed interest in the production of this duplex plate for industrial uses where



A refining furnace in the Bridgeport plant of Handy & Harman.

the corrosion resistance of fine silver would be desirable but the cost would be prohibitive and the electroplated deposit would not be satisfactory. Duplex or double plates of silver on steel, nickel, copper and base metal alloys can now be obtained in sheets of different gauges, and up to 25" or more in width, the thickness of the silver plate varying according to the particular use but generally running from five to 20 per cent. of the total thickness of the duplex sheet.

It should also be noted that experiments are being conducted with a view of producing an extremely thin non-porous silver plate on steel which would provide a comparatively low cost material for the manufacture of many different types of containers. Steel sheets which have been electroplated with a silver coating .001" thick have been formed into deep drawn containers. These tests showed that the extreme ductility of the silver allowed these severe forming operations to be done without the development of any pores in the silver coating.

The photographic industry has become a large consumer of silver; millions of ounces are used each year. The silver is converted into silver nitrate and as this has to be of a very high degree of purity its production is confined to large companies which manufacture photographic equipment and supplies or to chemical companies which have specialized in its production. Silver lined emulsion kettles, silver plated tanks, pans and other equipment are used by the photographic industry.

It is difficult to estimate the amount of silver that is used in chemical plants but reference to the list of corrosive agents given in Part 1 will give some idea of the possible applications.

Uses of Fine Silver

Fine silver can be obtained in the form of sheet, wire and tubing and is easily fabricated into all kinds of apparatus. It can be welded by skilled operators and by using lap or lock seams the use of high grade silver solders is often permissible because of the extremely limited area of the solder that is exposed to the attack of the chemical. Stills, autoclaves, heating or cooling coils, evaporating pans and kettles, condensers, crucibles and filter screens are a few types of equipment which can be fabricated without difficulty. Wire can be obtained in practically all gauges required, tubing from the smaller sizes to lengths of over 20 feet in 6" diameter and still larger diameters in shorter lengths. Sheets as large as 5 feet x 20 feet x .062" thick have been produced.

Smaller pieces of apparatus where the strength of silver is sufficient are made of the pure metal. In larger equipment silver linings have been used to a considerable extent. With the development of facilities for producing large sheets of silver clad steel, nickel or base metal alloys, the more extensive use of this material would seem a reasonable expectation.

In addition to its resistance to corrosion the high thermal conductivity of silver makes its use highly advantageous in many chemical processes. The reduction of time required for heating and the saving in heat units has shown remarkable economies in comparison with the cost of operating equipment made from other materials, with the further benefit of a superior product. The same reasoning applies when rapid cooling is desired.

The Question of Price

The relatively high price of silver as compared with other materials tends to prevent the consideration of its use for chemical equipment, without making a fair analysis of what the actual net cost would be. It should be recognized that the reclamation value of silver equipment may run as high as 75 per cent. of the original cost and this potential salvage means that a considerable percentage of the additional cost will be a matter of interest on the investment. When inserted silver linings are used these also have a relatively high scrap value and duplex sheets, which have a heavy protective coat of silver, have a salvage value that offsets the higher first cost. In those cases where a thin electroplated coating of silver offers suitable protection the reclamation costs may be so high as to prevent any appreciable salvage value but the original additional cost is comparatively small.

The commercial grade of silver used for chemical equipment is 999 fine or better (99.9% silver) and, as stated in an earlier paragraph, it is called fine silver. Copper is the principal impurity. Actually, most of the standard commercial silver in this country will run from 999.1 to 999.3 fine because the refineries want to be sure that their silver will not fall below the fineness of 999 which is required for good delivery. Silver having the highest degree of purity will offer the greatest resistance to corrosion in the majority of applications, but alloys may be used in some instances because of their higher strength or other desirable properties.

At the present time silver, silver linings, silver clad (or duplex metal) are extensively used in chemical plants for the manufacture and handling of acetic acid, organic acids, caustic alkalies, phenol, pharmaceutical products, ammonia and in the recovery of solvents in the acetate rayon industry. The tanning industry uses silver equipment and it is used to some extent in the manufacture of ink. These are some of the important uses of silver in chemical plants today but with the rapid advances that are being made in the chemical industry and the demand for products of greater purity it seems probable that increasing amounts of silver will be used.

In Sanitation and as a Fungicide

The bactericidal properties of silver have attracted considerable attention during recent years for the purification of drinking water and swimming pools. A small amount of silver will destroy the bacteria in pol-

luted water and make it safe to use the water for drinking or other purposes. Two methods can be used for introducing the silver ions, which are the purifying agent, into the water. The first or contact method consists in bringing the water in contact with finely divided vitreous material that has been coated with specially prepared silver. Considerable time is required for this method and it is applicable only to small quantities of water that are free from appreciable amounts of suspended organic matter which would prevent the action of the silver. In the other or electrolytic method silver plates are immersed in the water which is the electrolyte. A direct current is used with a voltage of 1.6; the amperes depending upon the size of the silver plates.

The germicidal value of silver leaf for the prevention of infections by placing it over the incision after a surgical operation has long been known. When silver plates are used to replace parts of the skull and wires for joining broken bones, infection rarely occurs.

Small quantities of silver are used for making drugs which have a germicidal action. Silver does not produce any toxic symptoms but, if too much of a drug containing silver is taken into the system over a long period of time, the portion of skin that is exposed to the light turns a blue slate color but otherwise no physiological disability occurs.

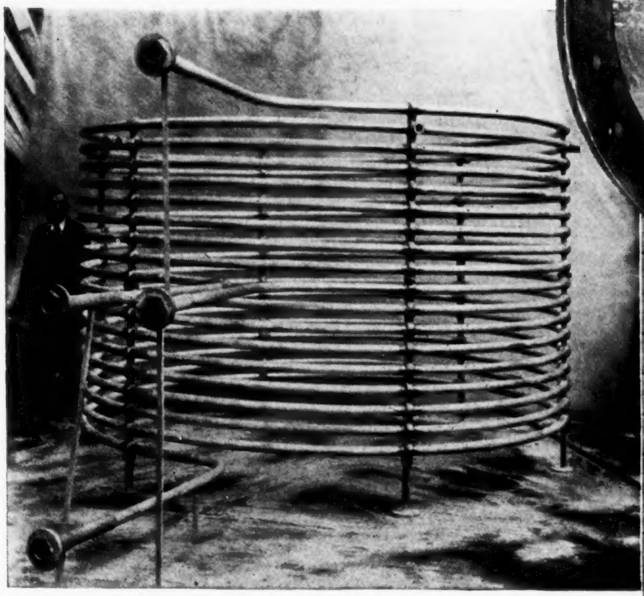
The use of silver compounds as a fungicide is being investigated and there are several applications where it may prove to be more satisfactory than any material in use at present. The dilution of silver sprays is such that their cost compares favorably with Bordeaux mixtures and tests indicate that they are more effective against certain pathogenic fungi than the copper or Bordeaux sprays. In other cases they are equally effective and do not damage or seriously discolor the fruit or foliage.

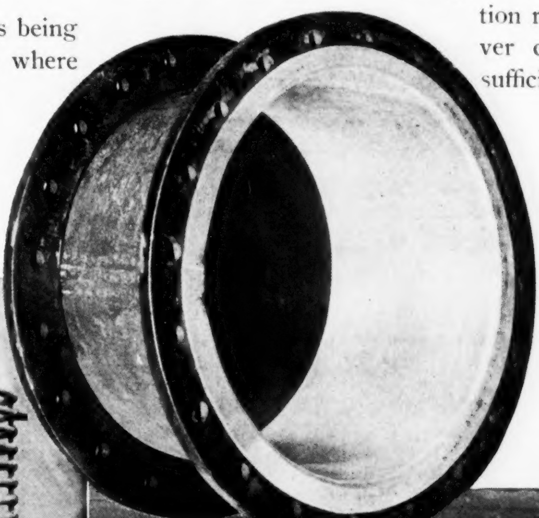
Foodstuff and Beverages

Pure silver and silver lined equipment are used in the foodstuff industries for several reasons: the resistance of silver to the attack of organic salts prevents any serious contamination, any small amount of organic silver salt that might form would be non-toxic, would have no objectionable taste and would not affect the color. The bactericidal properties of silver and absence of catalytic effects would also insure the food products against damage from bacteria or decomposition. White vinegar for pickling, jams, jellies and essential oils used for flavoring, fruit juices and extracts are among the more common foodstuffs that are produced with silver equipment. Silver has the same advantages for the preparation and handling of beverages.

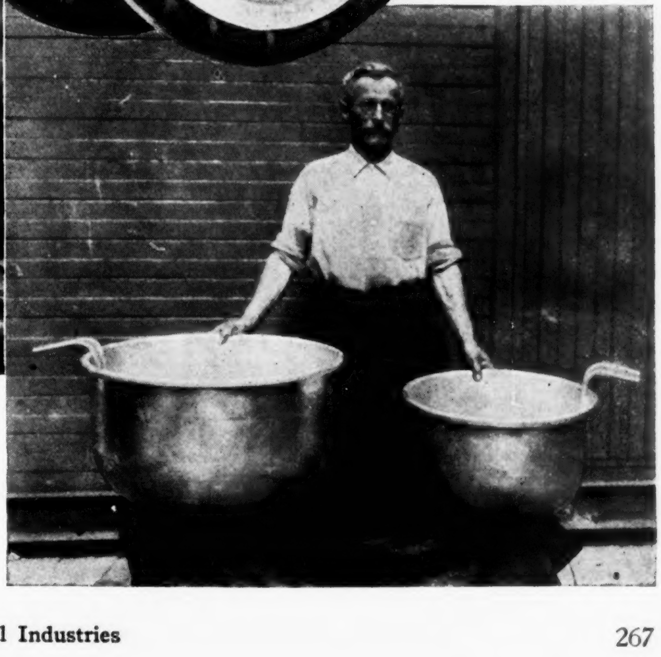
The use of silver plated containers for shipping beverages or foodstuffs has been given considerable attention recently. The silver coating must be sufficiently free from

Examples of the use of silver in chemical equipment. Below, an all fine silver coil, 1¼ inches outside diameter and 1/16 inch wall.





Cross section showing the use of silver clad (silver clad steel).



Fine silver pans with ¾ inch outside diameter employed in one of the country's largest pharmaceutical manufacturing plants.

pin holes to prevent any appreciable action on the base metal and the thickness of silver required to accomplish this has a direct bearing on the cost and the extent to which such containers will be used.

The silver clad metals available at present offer a suitable material for the manufacture of returnable containers that could be used for the more expensive products such as essential oils and essences. Heavy coatings of electroplated silver could also be used but the cost in either case would probably be too high if the containers were discarded after a single shipment.

For non-returnable containers the problem is one of developing an extremely thin impervious silver coating in order to bring the cost down to a point where the use of silver would be commercially practicable. Extensive research is being conducted along these lines, which if successful, will open up a new use that will consume a considerable amount of silver.

Miscellaneous Use of Silver

Silver is used for making mirrors and other types of reflectors because of its high reflectivity. Mirrors are made by a chemical process which deposits a thin film of silver on glass. Metal reflectors are made by electroplating a coating of silver on a polished metal surface and then giving the silver a very high polish.

Silver powders are used for painting designs on glass or other vitreous substances. Watch and clock dials are silver coated by making a paste of fine silver powder, salt, tartaric acid and water, which is rubbed over the surface.

Silver is applied to leather, celluloid products, cloth and other materials where its white metallic lustre gives it an ornamental value. Thermos bottles and electric light bulbs are coated with films of silver.

Fine silver is used extensively in the electrical industry. Fine silver wires are used where high conductivity is a paramount factor. It does not oxidize under ordinary conditions of use and a sulfide film that may form is a relatively good conductor of electricity. Silver contacts are used in great quantity on the many different types of electrical equipment in household and industrial use when the flow of the current is interrupted at varying frequencies. When bus bars are joined, the area in contact is coated with fine silver in order to insure the highest degree of conductivity.

Silver alloys have been used since prehistoric times for the production of silverware, ornaments and jewelry of every description. The consumption of silver for this purpose greatly exceeds any other use except for coinage or as a medium of exchange.

Although fine silver may be used occasionally, articles made from it are too soft for many purposes and varying amounts of other metals are alloyed with silver to give it the necessary strength and resistance to wear and at the same time to retain the color and sufficient malleability and ductility for fabrication.

Copper has been used as the alloying element since the time that primitive peoples discovered the native silver-copper alloys. The fineness of the silver copper alloys used in the arts and silverware industry varies generally from 750 to 950 fine. Articles are often made from alloys having the same fineness as silver coins, which in this country are 900 fine. In England and the United States the accepted standard for silverware is 925 fine and is called sterling silver. On the continent of Europe alloys from 800 to 850 fine are used extensively.

The origin of the term sterling silver is of interest because of the high quality it has represented for centuries and the large amount of silver that has been used in its production. Although slight discrepancies occur in different accounts, all seem to agree that the metal workers in the Eastern Provinces of Germany in the 11th and 12th centuries were noted for their skill and silver coins and bullion used by these provinces in trade was maintained at a uniform and high standard. Henry II employed some of these skilled metal workers to standardize the silver coinage. These workmen were called Easterlings and the particular alloy which they adopted contained 220 pennyweights of silver and 18 pennyweights of copper per troy pound which has 240 pennyweights. The alloy, therefore, contained ninety-two and one-half per cent. silver or was 925 fine and became standard not only for coinage but also for silverware. Easterling was contracted to sterling and the term has come down through the centuries as representing a mark of high quality. Millions of ounces of sterling silver are produced annually. The alloy has a beautiful white lustre when polished and although it is harder than fine silver it is extremely malleable and ductile and can be fabricated into practically every conceivable form without difficulty.

As a matter of scientific interest sterling silver is a classical example of the precipitation or age hardening alloys which have come to play such an important part in non-ferrous metallurgy. This alloy is highly resistant to attack under ordinary atmospheric conditions with the exception that it is tarnished by sulfur in various forms. Scientific investigators all over the world have devoted much time and money in the attempt to produce a non-tarnishing sterling silver alloy and also alloys of lower silver fineness. Work in this field of investigation has been extremely active during the past 18 years and innumerable compositions have been studied. When exposed to certain types of tarnishing conditions or tests some of these alloys have shown greater resistance to tarnish than the silver-copper alloys. When these same alloys are placed under conditions quite likely to be encountered in actual use their superior resistance is not discernible and in some cases they have tarnished more rapidly than the standard alloy. The physical properties and workability of other compositions as compared to the standard alloy must be considered and when all these factors are analyzed there has been no tarnish resisting alloy discovered

which has sufficient merit to encourage the silversmiths to use it to any appreciable extent in preference to the silver-copper alloy.

Silver alloys containing one or more of the metals, copper, cadmium, or nickel are used in the electrical industry for contacts in those applications where fine silver is too soft. These alloys run from 750 to 900 fine in silver.

Silver alloys are used in making dental amalgams. Special compositions have been developed but in general they will contain from 65 to 70 per cent. silver, 25 to 29 per cent. tin, 3 to 6 per cent. of copper and a maximum of 2 per cent. zinc. Another group of dental alloys contains silver in combination with one or more of the metals gold, palladium and platinum together with the addition of copper. These alloys have excellent physical properties, are white in color. They are used for plates, bridge-work and inlays and many of them have useful age hardening properties.

Silver hardens gold and these alloys are used in the manufacture of jewelry, but, as a rule, copper is added to the alloy and in many instances small amounts of other metals such as zinc, nickel and cadmium.

Silver is alloyed with either platinum or palladium for the manufacture of electrical contacts. Also alloys of silver, palladium and copper are used for the same purpose.

Importance of Silver Solders

Silver solders are a type of hard solder or brazing alloy which have been used in greatly increasing quantities in recent years in the industrial fields. Many of the standard silver brazing alloys contain silver, copper and zinc with the addition in some cases of tin, cadmium or other metals. They melt at temperatures from 650° C. (1200° F.) to 875° C. (1600° F.) which is below the range of base metal brazing alloys. These alloys are ductile and malleable and can be supplied in a wide range of sizes of sheet and wire. Their advantages are their low melting points, resistance to corrosion and great strength of joints that can be made with them. Although their first cost is higher than base metal alloys it has been demonstrated that the strongest joints can be made with very thin layers of silver solders and the actual cost per joint will in many cases be less than with base metal alloys. Joints made with them are resistant to shock and vibration and their low melting points give a large factor of safety from overheating the metals and alloys to be joined as well as a saving in labor and fuel because of the shorter time required to heat the joint. They contain from 5 to 80 per cent. silver but those used in the largest quantities contain 50 per cent. or less silver. Standard silver solders can be used for joining practically all non-ferrous metals and alloys and steel and iron. A proprietary alloy, Sil-Fos, composed of 15 per cent. silver, 80 per cent. copper and 5 per cent. phosphorus and melting at 1300° F. has been used extensively with copper and copper alloys. Another proprietary alloy called Easy-Flo contains 50 per cent. silver and melting at 1175° F. has found a wide application for joining ferrous as well as non-ferrous metals and alloys. The use of these silver brazing alloys has increased until millions of ounces of silver are used annually in their manufacture. The electrical and refrigeration industries are large consumers but their use has extended to practically every branch of the industrial field. The joining of pipes and fittings with silver brazing alloys is becoming an important use. The full strength of the pipe and fittings is retained because of the absence of threads and very strong joints are obtained.

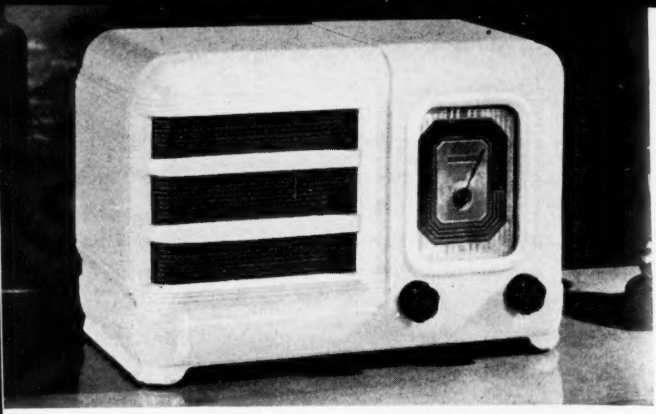
Silver powders are also being used in increasing amounts for making electrical contacts with refractory metals such as molybdenum or tungsten or with nickel which can only be alloyed with silver to a limited extent in the usual way. Mixtures of widely varying proportions are made by pressing the thoroughly mixed fine powders and then sintering them at temperatures below the melting point of silver. By alternately sintering and working these pressed mixtures it is possible to produce thin sheets of these compositions and wire with sufficient ductility for making electrical contacts in an automatic heading machine. Mixtures of graphite and silver can also be made with silver powders which can be used for contacts in the electrical industry.

The addition of small amounts of silver to copper raises the annealing temperature and the alloy is used to considerable extent. When 3 per cent. silver is added to tin the physical properties are much improved. The effects of the addition of small amounts of silver to other metals and alloys offers possibilities for investigation and some work has already been done along these lines.

A silver alloy, containing less than 2 per cent. silicon and the balance silver, has improved physical properties over pure silver and industrial uses may be developed.

An alloy containing approximately 2.5 per cent. silver, .015 per cent. copper and the balance cadmium has been produced in considerable quantities for the manufacture of bearings. Experiments are being conducted with bearings made from fine silver and silver alloys with small percentages of base metals. Another alloy, containing approximately 97 per cent. silver and the balance lead, has properties which indicate that it would be a suitable material for bearings subject to severe operating conditions such as found in airplane engines.

There is evidence from many sources that the use of silver for industrial purposes will continue to expand. The corrosion resistance of the metal and its alloys, the high thermal conductivity, high electrical conductivity and ease of fabrication, are some of the more important properties that justify its consideration by all engineers who are interested in obtaining better materials to meet the more exacting requirements of equipment for modern industrial plants and the production of higher quality products.



Newer Plastics May

WHITTLING fits wood. But it does not fit modern, high-speed, mass production. Industrial protection methods for wood are still essentially adaptations of whittling, faster whittling, more accurate whittling; but whittling nevertheless. Nothing streamlined about these whittling operations.

Now, however, industry has available scores of new materials that fit modern production methods as perfectly as whittling fits loafing. These are the synthetic plastics.

Out of them can be molded millions of identical pieces, quickly, cheaply, profitably. And the variety of them now available fits a multitude of industrial purposes, so that what is true of whittling wood is now also true of chipping stones and hammering metals. In many fields the mechanical adaptations of those handicraft operations are fast becoming as obsolete as the ox and the windmill.

First of all the synthetic plastics, and long the only one, was a mixture of nitrocellulose and camphor devised by Hyatt in 1868 to make billiard balls cheaper and better than costly ivory. When this mixture—celluloid—is warmed, it softens and can be pressed into the exact shape of even a complicated mold. Cooled, it hardens again; and the billiard ball, or what have you, comes from the mold ready for use after but the very simplest finishing to remove the mold fins.

Despite the fact that smokers' articles and other novelties of Bakelite were rather extensively used prior to 1929, it was the introduction of the urea-formaldehyde class of resins in that year that caught the eye of the general public and made them aware of these new synthetic materials. For prior to this time, except for all sorts of celluloid gadgets from artificial linen cuffs to baby rattles, the phenolic compounds had found their chief market in the electrical field in switch plates, wiring and insulation devices, none of which stirred the imagination of Mr. and Mrs. John Q. Consumer. But the urea plastics could be produced in a fine array of bright, light colors, and color caught the eye and held it.

All this is quite characteristic of the synthetic plastic materials. The whittling is done only once, when the mold is made. The saving is obvious. Billiard balls, for example, can be machined from ivory, but each one must be fashioned separately and much ivory is wasted in chips. In molding plastics, the mold is cut once and then used over and over to shape thousands, even millions, of pieces of plastic material. No waste of plastic

The striking illustrations of the use of plastics on these and succeeding pages furnished by the American Cyanamid Co., (Beetleware Division); The Bakelite Corp.; Carbide & Carbon Chemicals Corp.; The Catalin Corp.; The Celluloid Corp.; E. I. du Pont de Nemours & Co.; General Plastics; Makalot Corp.; Monsanto Chemical Co.; Plaskon Co.; and Tennessee Eastman Corp. The editors of Chemical Industries will be glad to furnish additional details to anyone interested in these materials.

New Goods for

Solve Your Problem

either as there is of ivory in cutting it. The amount needed to fill the mold exactly can be ascertained and just that amount used for each molding. Then, of course, no jungle safaris to hunt elephants are required to supply plastics!

Now, celluloid billiard balls are of no great consequence in industry and never were, but the molding of plastics, originally devised to supply better and cheaper billiard balls, dealt industrial whittling the first of a series of body blows.

Celluloid and manufacture from it were old before the first synthetic resin plastics were developed. Belgian-born, American scientist and inventor, Leo H. Baekeland, made the first commercially successful synthetic resin, Bakelite, in 1907. He was attempting to make shellac, and he discovered that formaldehyde and carbolic acid made an amber-like material which opened industry's eyes to the vast possibilities of innumerable synthetic resin plastics and the advantages of molding over whittling, or chipping, or hammering.

The consequences have killed industrial whittling. No longer can a manufacturer expect to profit by fashioning wood, glass or metal into small articles in the traditional ways. The ease of fabrication of synthetic plastics into buttons, bottle caps, brake bands, or beads overcomes the higher cost of raw material and lowers the final overall cost of the articles.

Research has met the new demand created for molding materials of this kind by continually developing other new ones fitted particularly to serve special uses. So successfully have the most curious and exacting requirements been met that during the past 15 years production of synthetic resins in the United States increased a hundred fold. And the rate of increase shows no sign yet of diminishing. Of course, the largest single use of synthetic resins is in surface finishes.

Old Industries

A Collaboration By Gustavus Esselen, Inc., Arthur D. Little, Inc., and Skinner & Sherman, Inc.

Natural products which they resemble are amber, shellac, copal, and rosin, but in variety and usefulness they have gone far beyond these natural prototypes. Bakelite, Beetle, Plaskon, Lucite, Vinylite, Butvar, Ethocel, are names given a few of these new materials whose continuing impact on industry has affected the most varied lines of production. Also in this list should be included the various trade names for forms of cellulose nitrate, cellulose, and polystyrene molding materials. Amber-like pipe bits, pens, pencils and similar small gadgets were early made of these synthetics. Later they began to compete with hard rubber and porcelain in electrical instruments, motors and equipment; with wood, glass, coral, marble, and metal in innumerable articles molded not fashioned.

As these new applications spread scarcely any branch of industry has been unaffected. New needs created by the industries using resins and new utilities discovered for plastics have become at once important opportunities for profit and perilous hazards to ill-considered industrial planning.

Into the first category falls the widening use of copper hardened by alloying with beryllium, heretofore a rare and costly metal but now dragged from its pedestal to do valuable work. From copper thus hardened, intricate molds for the shaping of modern plastics can be cast at a less cost than that of machining them from steel, a situation significant in planning for the future of certain machine shops and certain foundries.

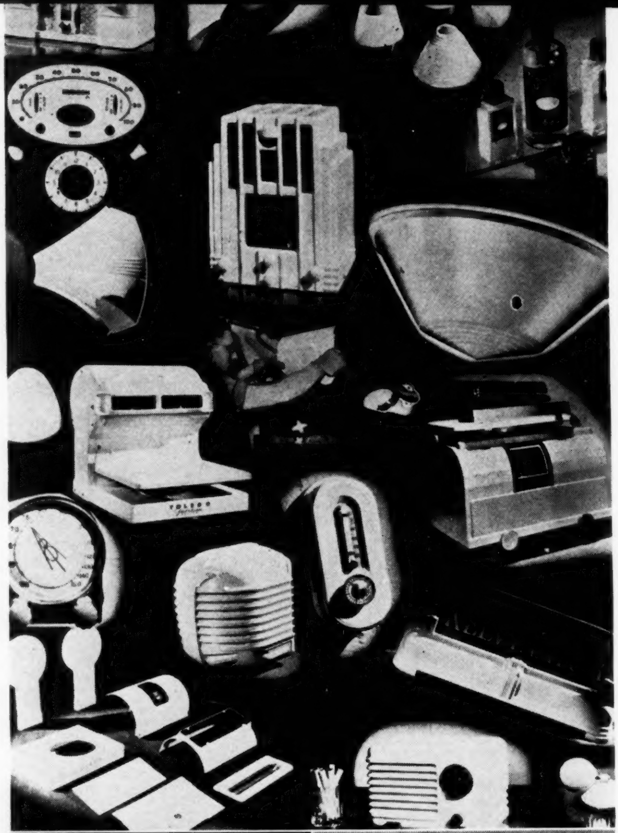
In the second category are applications of resins in new fields where they replace old materials. Among the recent new applications of moment and of potential danger to the unwary are: resinous spectacle lenses less liable to break than glass; bearings of resinous plastics which replace more costly bronze and can be lubricated with water instead of oil; resin impregnation of textiles to impart permanent stiffness abolishing restarching after every laundering; plates from synthetic plastics

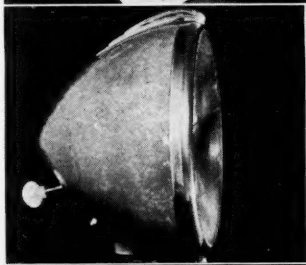
which cheapen and simplify printing; firearms for spreading tear gas made of rustless resins to avoid misfiring through lack of oiling. The list could be extended almost indefinitely to show a variety and novelty of applications that are a hazard to lazy, sleepy industries.

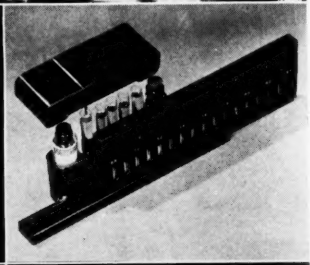
This amazing new use of synthetic plastics touches every phase of life. Innumerable articles made wholly or partly of synthetic plastics are indispensable in homes, offices, airplanes, railways, automobiles, hospitals, doctors' offices, and indeed practically everywhere. The variety of shapes and designs are beyond enumerating and no limit yet appears to future possibilities.

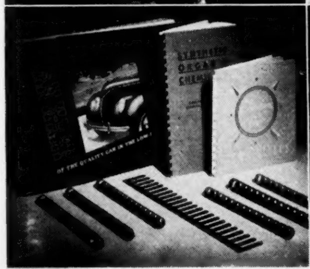
The basic raw materials for these eminently useful materials are few in number: coal, salt, water, air, and cellulose. From these are made synthetic plastics which fall into two great classes: those made from cellulose and those in which cellulose has no part. The two classes are highly competitive in some applications (but not in all) and are so seldom clearly distinguishable by the ultimate user that no attempt will be made here to keep them separate.

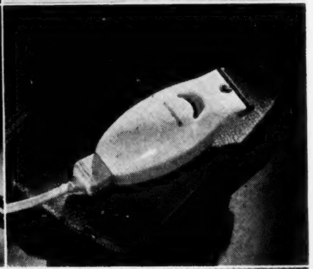
Present-day comforts and luxuries in the home are based upon synthetic plastics with their myriads of colors and shapes. The "modernistic" touch to decorations is easy to obtain by combining plastic panelling and molded articles in the forms of tables, chairs, wall decorations, lamps and window blinds. At the front door on a dark night the keyhole may be illuminated with a luminous ring recently developed in England in which a very transparent resin is combined with material which glows in the dark. The door knob may be molded from cellulose acetate and the door of laminated

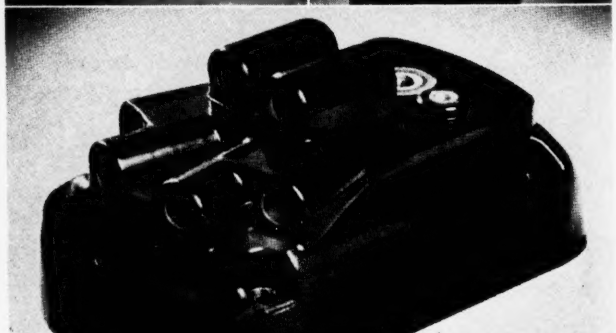


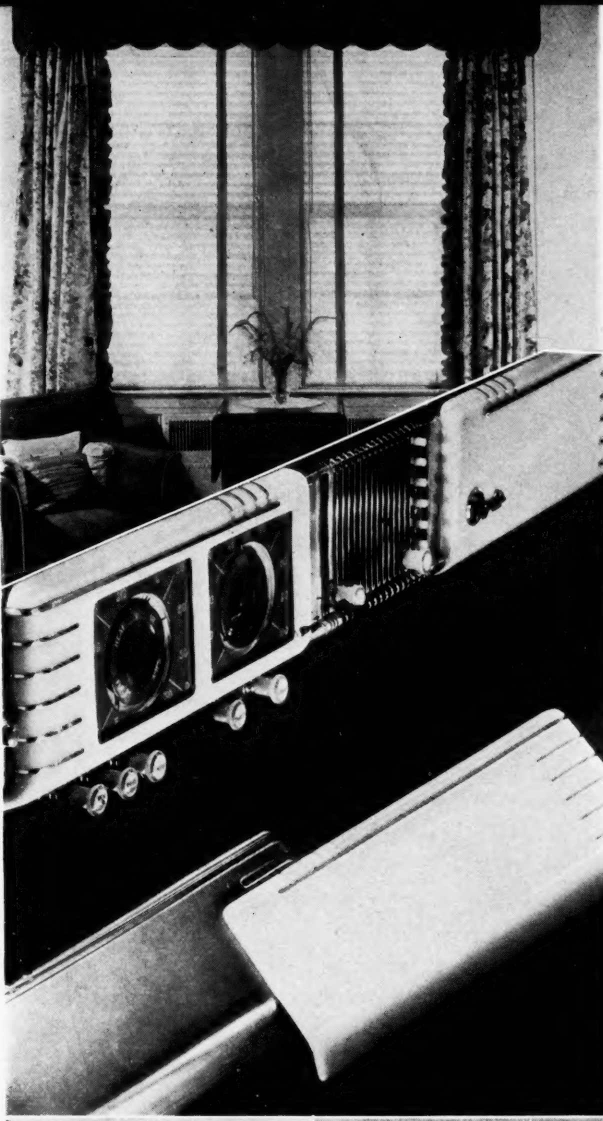








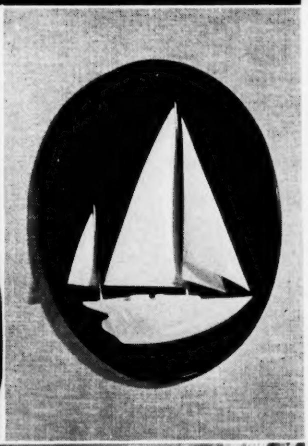




phenolic resin with its surface grained to look like rare and costly wood. The bonding of fabric with resins under pressure and heat give great strength and permit the formation of panels of unique and striking design which can be used for walls, pilasters, cornices and other parts of housė construction. Panelling of this type is not only useful in houses but also in office buildings. In Europe, in France, particularly, card tables and chairs are being molded from resins without metal reinforcing. On them the game may be played with cards also of synthetic plastic. Later we may relax to music from a phonograph record once made of shellac, but today meeting the higher fidelity required for radio broadcasting by being molded from cellulose acetate or polyvinyl resin.

Decorations of all kinds are made by molding cellulose acetate. Table ware has been made from brilliantly colored Plaskon and Beetle urea formaldehyde resins. Recently brilliantly clear transparent plates, cups and saucers have been produced from polystyrene, one of the newest commercially available resins. Venetian blinds now so popular are available and are largely made with urea formaldehyde as the resin.

Lighting fixtures and reflectors as large as 26½ inches in diameter are made from Plaskon. The advantages of the large reflectors are that they are lighter in weight, are cheaper, and diffuse light better. Other less visible electrical equipment, junction boxes, switches, meter cases, etc., is molded from phenolic resins. The recently developed Lustron lights primarily used for sign advertising are made from Catalin, a cast phenolic resin, in almost any desired shape and color so that lamps can be easily interchanged.



Large radio cabinets are made today from Bakelite and Plaskon resins in pleasing colors and design. Even the Radio Nurse, which permits the mother to hear the cry of her child in his room when she is in some other part of the house, has a molded housing. In Germany very satisfactory long-wearing floor tiles have been made from Mipolam, a vinyl resin. We use in America floor tiles made from coumarone-indene resins.

On a laminated plastic table top lies somebody's spectacles, the rims of which are from cellulose acetate and the "glass" an acrylate resin, possibly Plexiglas, ground to the optometrist's specifications. A truly remarkable accomplishment! These glasses will not break when dropped and are very light in weight. This same resin may form the lens of a small camera whose case is molded from other resins.

Smoker's accessories are made with plastic inserts on metal frames; ash trays from all types of plastic without metal support are found in the rooms of the modern house. Cigarette cases made of ethyl cellulose appear in a variety of colors. They have exceptional dimensional stability and are light in weight because thinner walls can be obtained with Ethocel than with many of the other plastics available today.

Preserving the Rare Orchids

A rare orchid may be preserved by imbedding it in acrylate resin by a special process which retains all its coloring and beauty of form. Since the resin is practically unaffected by moisture, this method of preserving specimens is finding extensive use in museums. Sheet plastic, under the trade-name Vue-Pak, makes a display container with the advantages of glass and without its weight or breakability.

In the bathroom, the toilet seat is made of celluloid or cellulose acetate. The tooth brush handles are of the same material, also Nylon bristles for hair brushes have recently become available. Several plastic plumbing accessories are now on the market. On the make-up table the combs, brushes, mirrors, powder boxes, cold cream containers, and numerous other articles to please milady's fancy, are molded in part from various plastics. Small containers for perfume bottles, handles for powder puffs and many, many do-dads which lend charm to milady's boudoir unknown a few years ago are found in profusion among even the articles in the 5 and 10 cent stores. Hair ornaments, combs, curlers, handles for curling irons, etc., are cheaply and beautifully made by high-speed production methods.

The man of the house, too, finds plastics in his toilet articles. The handle of his shaving brush may be of acetate, or if he uses an electric razor, the housing is of molded phenolic or urea resin. The caps of the after-shave lotion bottles are most apt to be plastic.

In the nursery, where eye appeal is important, the toy designer has great latitude in the use of brilliantly colored cast and molded resins of all types. Automobiles, airplanes, handles on toys, almost any toy can be made from synthetic materials.

In the kitchen are plastic knives, forks, panelling of the kitchen cabinets, panels on electric ranges, and a stain-proof, mar-proof counter or table top of laminated fabric with phenolic resin.

In the family automobile the dashboard is often molded of cellulose acetate. The British have lately developed a method of molding plastic directly onto sheet metal reinforcing. Plastic on metal instrument boards are made in the United States. Steering wheels, knobs and door handles, are usually made from cellulose acetate, and ash trays from a phenolic or urea-type resin. In some American cars Lucite (an acrylate resin) is used in direction signals on the rear of the car on account of its ability to transmit light with high efficiency. Gears in the motor are occasionally canvas impregnated with a phenolic resin and molded under very high pressures. Gears of this type are known for extremely long life and do away with gear-grind. Many English cars enclose the ignition cables in conduits molded of phenolic resins which are impervious to oil, grease and dirt. For many years in this country distributor and timing gears have been molded synthetics. The distributor is usually a phenolic, and soy bean meal may be used as the filler.

Resins for fog lights and headlights may be molded from acetate, and a remarkable headlight lens from polystyrene has been developed in England. The lens is made up of a number of molded interlocking pieces which, when assembled and held in place by a plastic frame, form a unit which completely eliminates dazzle or glare. This is an excellent example of the preciseness which can be obtained from well-designed and constructed dies. The plastics industry has played a part in the commercial development of Polaroid lights.

Probably the largest automotive use of plastic material is in safety glass. This consists of two glass sheets cemented to a plastic sheet between. When non-shatterable windshields first appeared, the interleaf was a nitrocellulose plastic similar to celluloid. Sensitive to sunlight this gradually discolored in use. It was replaced by cellulose acetate with increased resistance to the sun's rays, and now acetate is being replaced by purely synthetic plastics. The polyvinyl acetal resins are now adopted as the sandwich filling of safety glass. These resins resist moisture so that the edges of the laminated glass need not be protected. Nor do they discolor under continued exposure to sunlight. They are specially noted for the fact that windshields made of this material do not shatter at low temperatures.

Transparent oil cans in which the body and spout are of cellulose acetate and the base of copper are becoming common. Among recent articles to find favor are plastic clothespins whose colors brighten a "blue Monday."

Handles of cellulose acetate for saws add not only color to drab equipment but they are also tougher than wood and easier on the hands. Screw drivers, particularly for the electrician, have molded handles which will not turn.

Plastics are by no means limited to such gadgets as just described. Demand in the airplane industry for light weight and great strength is insistent. Walls and even the windows of the newer air liners are made from Plexiglas. The lighting fixtures employ urea resin for a soft light and lessened weight. The fuselage of some newer planes contains an ever increasing amount of laminated plastic sheet to give greater strength than thin metal with less weight. In German experimental planes wings have been fabricated satisfactorily of laminated plastic which materially reduces ice formation. Newer American air liners are using Micarta pulleys in small sizes to handle the various control cables of the ship. These are light, do not split, rust, nor cause wear in the cables. Thus is flying safety increased. The radio direction finder is made largely of plastic because the loop must be completely protected from the weather and still receive the incoming signals without interference. In this type of instrument the form holding the wire of the loop may be Bakelite or polystyrene and the housing cellulose acetate or Lucite for appearance and protection.

The railroads have experienced an amazing evolution in lighter weight and high-speed. The newer trains have furniture of the most modern design built with laminated resin table tops and panels throughout. This new trend is especially marked in the diners of the Broadway Limited and the Twentieth Century. The whole plan of the car has been redesigned and panels of Plexiglas emit soft diffused light from the ceiling and walls. By using laminated panelling in the walls great weight saving has been effected with resulting increase in speed and more economical operation. Even the window sills of the car are of laminated plastic. Touches of Lucite and Formica here and there add to attractiveness.

Resins are also useful in heavy industrial machinery. Little would one expect that bearings superior to metal can be made from laminated plastics for use in steel, sugar and textile mills. Plastic bearings are in 24 hours service in a 16-inch strip rolling steel mill and give better service than metal. Tail shaft bearings which carry very heavy loads are made from Micarta. Gears up to 36 inches in diameter, three to four inches across the face also give phenomenal service, standing up to heavy strain on the teeth without cracking.

Lucite, a methacrylate resin, is finding increasing use in surgical and medical work. One company has developed Lucite splints that are very rigid and easily conformed to the part desired. When in place it is not necessary to remove the bandages for X-ray examination as these splints in no way affect the picture. A most interesting property of Lucite rods is their ability to transmit light longitudinally. This property is utilized in exploratory instruments for the nasal and throat passages. A large rod can be bent around so that a light source back of the patient's head will completely light the mouth for oral surgery.

Large moldings, impossible a few years back, appear in the housings of adding machines and typewriters. These are generally phenolic, where great strength and thin wall sections are desirable. Recently developed is the Cardineer filing system which depends upon a molded plastic wheel 21 inches in diameter to hold 7,000 cards available to the operator. This wheel is made of phenolic type resins. Many other business machines have been modernized by designs for the use of large quantities of plastics. Plaskon scale housings are worthy of special notice.

Plastics in the Chemical Industry

Even as the synthetic plastic is a child of chemistry it returns to the chemical industry in varied roles to help its parent. Centrifugal pumps have linings and impellers of fabric-filled phenolics which withstand in an amazing manner the corrosive action of many products.

The rayon industry demands molded synthetic spinning buckets from phenolics, and a new continuous process uses a plastic spinning reel. These articles are subjected to sulfuric acid, sulfur, and carbon disulfide 24 hours a day, 7 days a week.

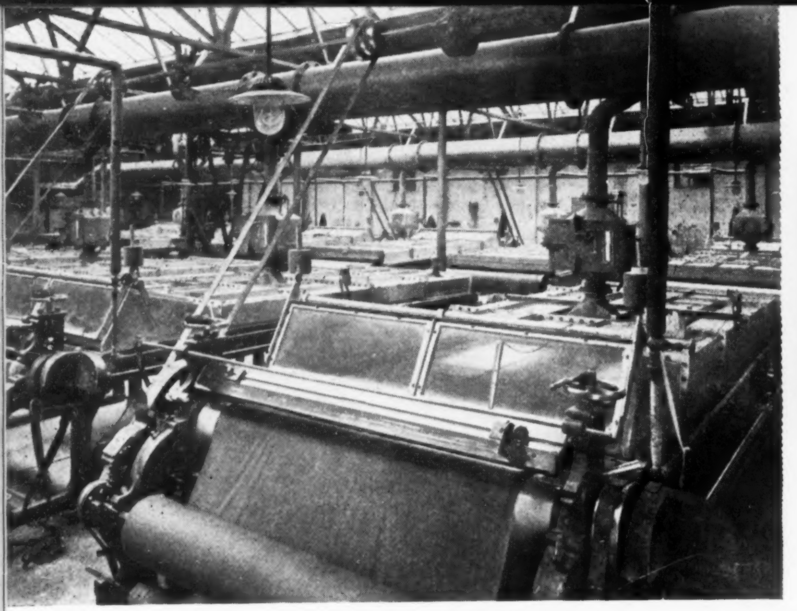
The great resistance of resinoid coatings of the phenolic types to chemical action makes them useful in linings for steel tanks for corrosive chemical reactions. Beer vat interiors are protected with a phenolic resin base coating and vinyl resins line the cans in which beer is packaged.

Compounded phenolic resin and washed asbestos paper permit the construction of vessels as large as 9 feet in diameter. Chemically resistant pipe is produced from the same material. A steel or metal frame is employed in large equipment.

Plastic rifle stocks are made from a fabric-filled phenolic powder known as "Novolak." These are heavier than the walnut wood commonly used so German infantrymen must tolerate the added weight helping to make their country economically independent. Noses of anti-aircraft shells have been made from phenolic resins in Germany. How successfully this type of nose is in actual practice is not yet known outside official circles.

Other molding compounds are used to a less extent than the classes mentioned. Each plastic has its own characteristics. Although two or more may be adaptable to one article or class of articles, in other cases, one synthetic may have properties so exactly suited for a particular job that no other can compete. The industrial user of resinous plastics has a wide choice from which to select, with the aid of competent experts, just the correct material for his particular problem.

Who can foretell the future of an industry developing so rapidly? This, however, is true. Industrial whittling, or chipping, or hammering, is forever obsolete as a method of quantity production. New plastics and new applications are being discovered daily. Each enlarges this field. Every new application opens up new opportunities for the alert manufacturer.



Vapor collecting hoods, each provided with a flame arrester, installed on horizontal rubber spreaders.

Wealth from Waste

VAPORS lost in manufacturing processes are generally valuable, and even in relatively small plants their waste means the loss of substantial sums of money.

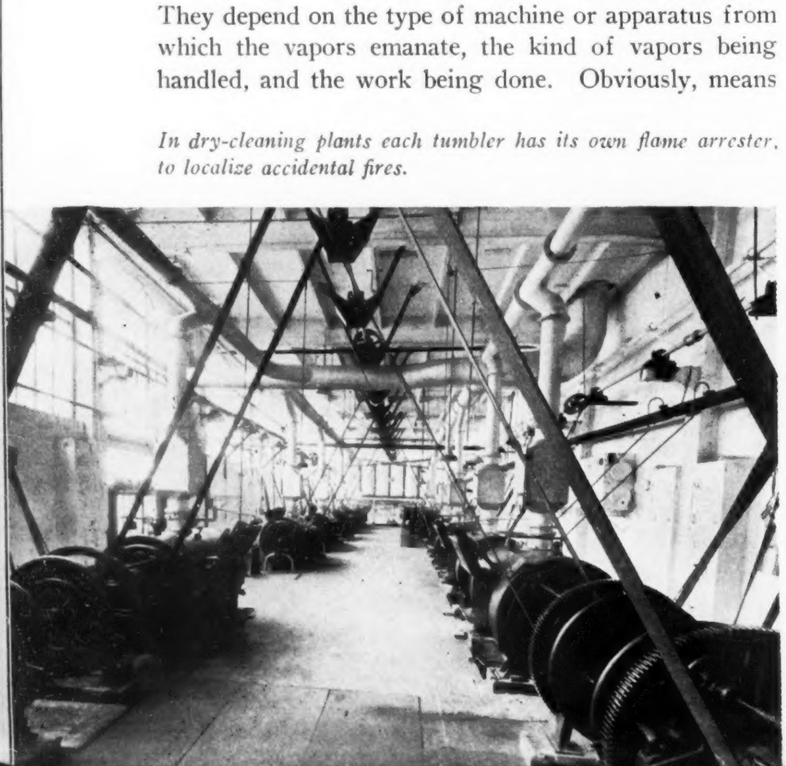
Solvent vapors are perhaps of greatest economic importance, because solvents are used in large quantities and are expensive. The recovery of alcohol from fermentation gases and of carbon disulfide in viscose production, not yet practised in this country to any great extent, also represent potential sources of income for progressive manufacturers.

Methods of Recovery

The methods of recovering vapors may be divided into three broad classes: 1. Condensation by refrigeration or compression; 2. Absorption by fluids; 3. Adsorption by solids. All of these have one thing in common, and that is that the vapors must be collected with the greatest possible efficiency. No recovery equipment can be expected to return for reuse vapors not collected and delivered to it.

Means for collection of vapors will vary greatly. They depend on the type of machine or apparatus from which the vapors emanate, the kind of vapors being handled, and the work being done. Obviously, means for collecting the vapors from a printing press will differ widely from those used in paper coating or cloth impregnating machines. Similarly, the collection of CS_2 vapors in a viscose plant is not as simple nor as efficient as would be the collection of CO_2 carrying alcohol vapors from closed fermenters.

In dry-cleaning plants each tumbler has its own flame arrester, to localize accidental fires.



Recovery by Condensation

Perhaps the simplest way of recovering vapors is by condensing them out of the carrying medium (usually air). Such condensation takes place whenever at a given temperature the vapor concentration exceeds the saturation point of the carrying medium. Cooling and compression reduce the concentration representing saturation, and precipitation occurs.

The operation of such systems requires an initial vapor concentration as high as possible, generally falling within the explosive range or above it. This represents the main objection to the use of direct condensation in vapor recovery, and since the yield or efficiency of recovery is rarely as much as 50 per cent. of the vapor delivered to the recovery unit, this method of recovery finds little use.

Herbert[1] has given values for condensation of a number of typical solvent vapors at various temperatures. For instance, air must contain at least about 200 grams of benzene, 380 grams of acetone, or 1300 grams of ether per cubic meter in order to cause condensation at 10° C. All these values are above the explosive range of the vapors named, but to reach such concentrations it is necessary to pass through the explosive range on starting and stopping the apparatus wherein evaporation takes place.

In order to increase the efficiency of recovery, use has been made of machines fully enclosed, with drying compartments at high temperature and cooled walls and floors, these cooled surfaces serving as condensers. The extent of tightness required is such that it interferes with operation and inspection of the work being done and although a substantial increase in recovery efficiency is attained, does not do away with the danger of explosion on starting and stopping.

Recovery by Absorption

In the absorption systems vapors are removed from the carrying medium by intimate contact with an absorbent fluid flowing countercurrent through a scrubbing tower.

Such methods have been comprehensively considered

RECOVERY OF WASTE VAPORS

By E. L. Luaces*

IN this, the second article in the series "Wealth from Waste," E. L. Luaces, chemical consultant and widely recognized authority on problems dealing with utilization of by-products and the conversion of waste, discusses the broad engineering and economic aspects of the conversion of vapor waste into profits, and points out how we in this country have pioneered in the erection of large plants for the recovery of solvent vapors.

by Wiessenberger[2] and his co-workers. They make use of the solubility of vapors in various fluids. The quantity absorbed is proportional to the concentration of vapor in the carrying medium, and is dependent on the vapor pressure and boiling point of the substance being absorbed so long as no chemical interaction occurs between it and the scrubbing fluid.

Absorption methods have the advantage over condensation in that they do not require high concentration for economical operation. Their main disadvantages are that they cannot always successfully operate below the lower explosive limit, that uniform rate and composition of feed are required, and that it is invariably necessary to subject the recovered substance to further purification before reuse.

Spurlock[3] has given a very interesting example of the calculation of an installation for the recovery of acetone by water scrubbing.

Recovery by Adsorption

Adsorption on a solid adsorbent such as activated carbon is probably the most satisfactory way of effecting vapor recovery. It has the advantage of being able satisfactorily to operate at vapor concentrations far below the lower explosive limit and at the same time extracting nearly 100 per cent. of the vapor in the air passed through the adsorbent. This type of recovery has been so successful in its application that we will consider at some length the recovery of vapors as carried out with activated carbon.

As has been pointed out above, it is necessary to collect as much of the vapor as is possible in order to attain a high efficiency of recovery and thereby increase the profit from the recovery installation. To this end

* 305 Madison Avenue, New York.

Fermentation CO_2 is collected from closed fermenters at left for alcohol recovery. Open fermenters at right.

hoods or covers designed to enclose the apparatus wherein vapors are generated without interfering with its operation, are fitted around the equipment. In the case of a coating or impregnating machine or printing press the vapors are collected with large volumes of air. In the recovery of alcohol vapors from fermentation CO_2 the carrying medium is fermentation gas.

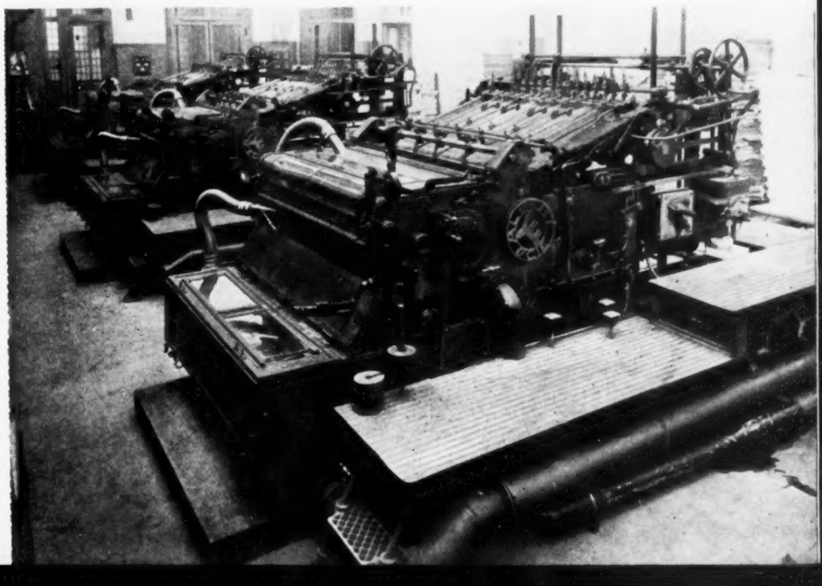
In some cases, as in the recovery of CS_2 in a viscose plant, impurities are collected at the same time (in this case H_2S, sulfuric acid mist, sulfates, etc.) and should be separated or removed to facilitate the recovery operation.

As an example, we shall consider the recovery of solvent vapors. The air is admitted to the recovery units or adsorbers after passing through an air filter and flame arrester. This apparatus is designed and constructed in such fashion that if accidental fire occurs in the workroom or in one of the machines where solvent is evaporated, it will effectively prevent the passage of flame into the recovery equipment. Dust and finely divided matter are likewise kept out of the adsorbers.

Adsorption and Regeneration

The solvent-laden air, after being filtered, is admitted to an adsorber, of which there are generally two. This

Vapors are collected from sheet-fed gravure printing presses without interfering with operation.



is the first stage of the recovery process and is called *adsorption*. The adsorber contains a bed of highly activated carbon which adsorbs the solvent vapors contained in the laden air, after which the denuded air is discharged outside of the building. When the activated carbon in the adsorber has become saturated with solvent vapors, the flow of laden air is diverted to a second adsorber while the first enters the second stage of the recovery process—*regeneration.*

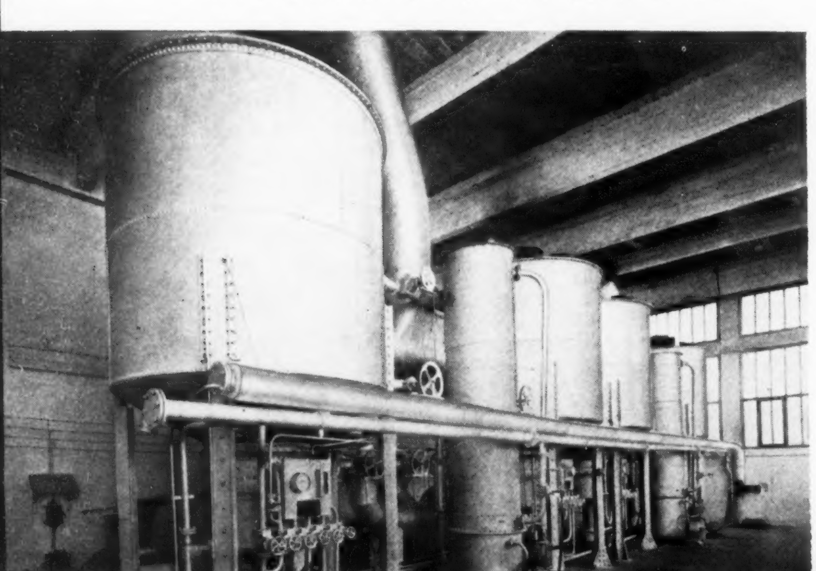
Regeneration consists of removing from the carbon in the adsorber the vapors it has adsorbed and removed from the vapor-laden air aspirated from, for instance, coating or spreading machines. To this end, steam is opened into the adsorber to distil the adsorbed vapors, and the distillate is sent to a suitable condenser forming part of the recovery installation. The vapor is recovered as a water mixture or water solution, depending on whether or not the solvent is miscible with water. If the solvent is miscible with water, as in the case of ethyl acetate, alcohol and acetone, the condensate is delivered to a suitable rectifying column to separate the solvent from the water. If the recovered solvent is immiscible with water, as in the case of naphtha, benzene and trichlorethylene, a decanter separates the water, which is discharged into the sewer, from the solvent, which is delivered to storage. In some cases miscible and immiscible solvents form part of the solvent mixture used. In such cases the immiscible portion is decanted and the water containing the miscible portion is delivered to the rectifying column.

When all the adsorbed vapors have been distilled from the activated carbon in the adsorber, this is ready for the third and last stage of the recovery process—*drying and cooling.*

Drying and Cooling

A certain amount of steam is condensed during distillation and the carbon is wetted. If the nature of the vapors being adsorbed is such that moisture in the adsorbent would interfere with their removal from the vapor-laden air, the adsorbent is dried. To this end warm air is circulated through the carbon bed in the

Adsorption system in a modern dry-cleaning plant. Solvent loss is less than three per cent. of weight of garments cleaned.



Explosive Limits of Some Typical Vapors

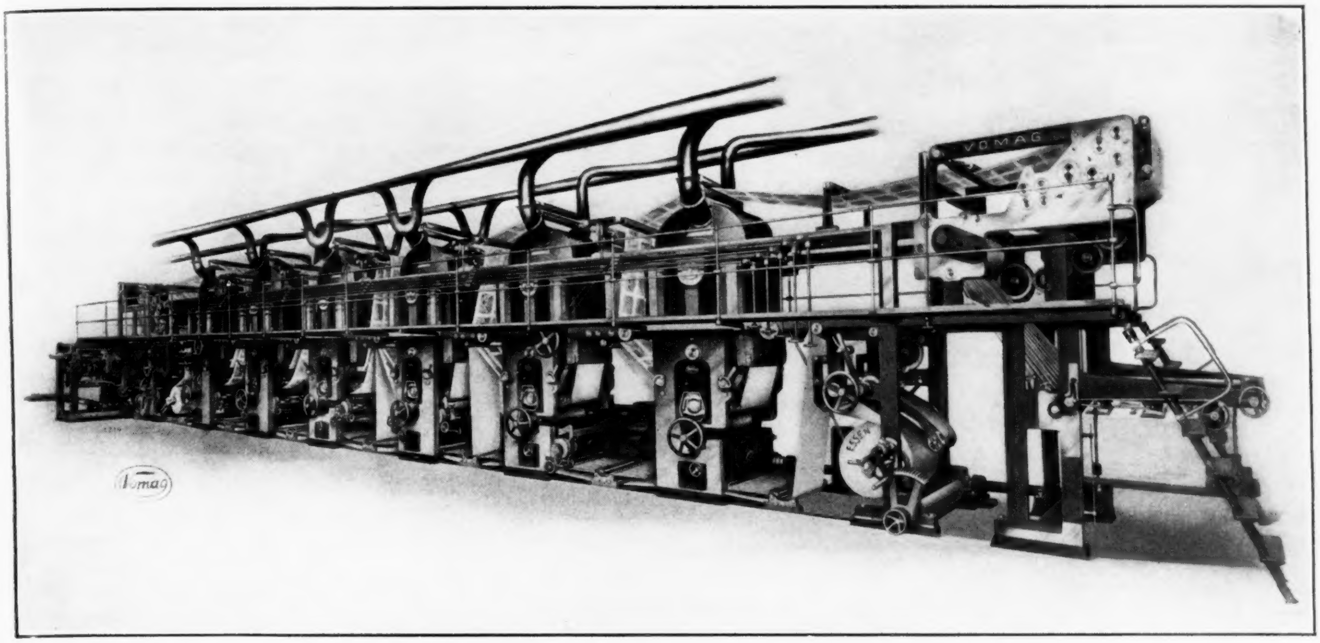
Vapor	Explosive Limits: Lower % by vol.	Lower g/M^3	Upper % by vol.	Upper g/M^3
Acetone	2.5	60.5	9.0	218
Alcohol (ethyl)	4.0	73.3	14.0	256
Alcohol (methyl)	5.5	73.4	21.0	280
Benzene	1.5	48.7	9.5	308
Carbon disulfide	1.0	32.0	50.0	1580
Ethyl acetate	3.25	82.4	11.0	403
Ethyl ether	1.25	38.6	10.0	308
Ethyl formate	3.5	108.0	16.5	510
Methyl acetate	4.1	126.0	14.0	430
Methyl ethyl ketone	2.0	60.0	12.0	180
Toluene	1.3	50.0	7.0	268

adsorber until the moisture has been removed. This warm air may be obtained in several ways. It may, for instance, be artificially produced by passing room air through a suitable heater. A second way is to provide the adsorber with a heat regenerator within its body. Generally the regenerator is placed at the bottom. Steam is passed downwardly during the distilling period. It passes through the activated carbon bed and then through the heat regenerator, to which it gives up part of its heat. If at the end of the steaming period air is passed upwardly through the heat regenerator and the activated carbon bed, it will adsorb heat from the former and give it up to the latter, thereby driving off the moisture held by the activated carbon bed. If no drying is done, the adsorbent is cooled by passing process (denuded) air from one adsorber through a second adsorber, or room air may be used instead. If the adsorber is provided with a heat regenerator, it will cool to room temperature shortly after the heat has been dissipated from the regenerator due to the fact that the room air used is no longer being heated. If process air or room air is used, no cooling is necessary, in view of the fact that the bed temperature at the end of the drying period will be sufficiently low to allow the carbon properly to adsorb vapors from the laden air.

Flexibility of Design

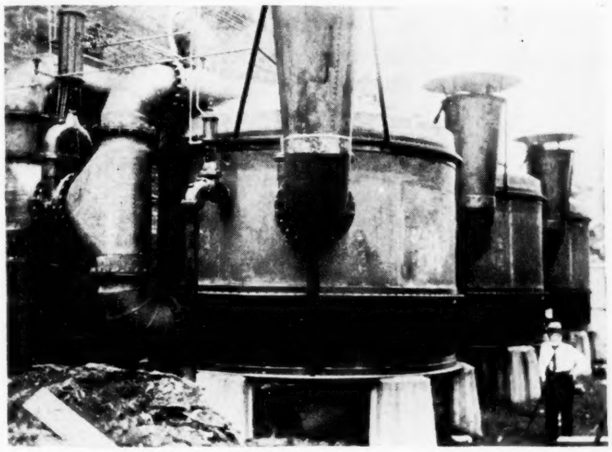
Large plants may have more than two adsorbers. In two-adsorber systems one adsorber is in service while the second is being distilled, dried and cooled. In three-adsorber systems one is in service, a second is being distilled and a third dried and cooled. It is seldom that more than three adsorbers are used. In any event, adsorption plants are engineered in such fashion that flexibility is one of their virtues, and while they are designed for continuous use, they may be operated intermittently without any additional cost. To handle a lower evaporation rate the cycle of adsorption need only be increased. If a reasonably higher evaporation rate is temporarily necessary, the cycle might be shortened to take care of it.

The designing of vapor recovery installations using adsorbents requires a thorough knowledge of adsorption and the use of a great deal of practical data acquired only through experience. Many factors influence the final result and must be considered. To name a few:



Vapors are collected with over 80 per cent. efficiency while paper travels through Fuykers' dryers at the rate of over 1000 feet per minute in this seven-unit Vomag rotogravure printing press.

concentration, air temperature and velocity, bed thickness, per cent. saturation, break-point of adsorbent. Various designers will attack the problem from various



View during erection of adsorption recovery system recovering mixed solvents in an artificial leather plant.

angles and reach substantially the same goal by different roads. Custom and local conditions play an important part in arriving at the ultimate design and account for the great *apparent* differences in American and European practice.

American vs. European Practice

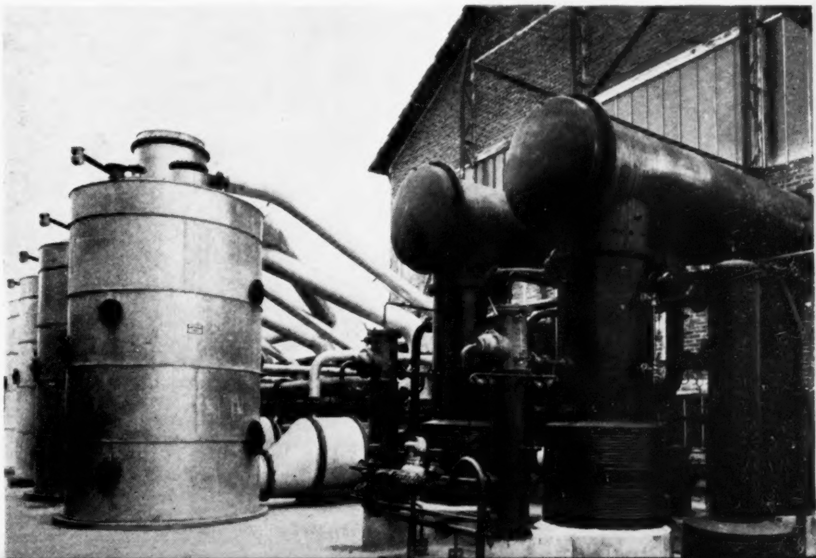
While vapor recovery by adsorption seems to have had its origin in Europe shortly before the great war, it received much attention in the United States after the war, and the first large-scale use of the process was probably made here. Even so, Europe today leads in number of installations with over one thousand, but most units, outside of the natural gasolene industry in Poland and Rumania, are small as compared with American installations. In the United States some sixty installations are now in use, most of them recovering complex solvent mixtures with a high degree of efficiency.

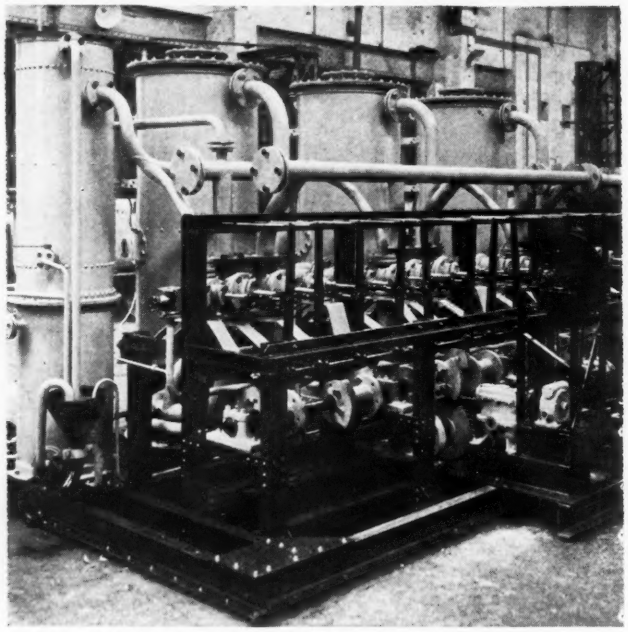
European practice is characterized by the use of equipment set vertically and in the construction of which low labor costs are reflected. American designers originally worked along the same line, then went over entirely to horizontally disposed adsorbers, and only in very recent years have begun to swing back. Horizontal adsorbers still predominate in American design, but vertical adsorbers have been installed in at least five adsorption plants during the last three years. Use of high-velocity, high-turbulence, self-cleaning condensers and coolers distinguishes these newer American installations from their European counterpart.

Automatic Operation

Automatic operation of recovery systems of the kind under discussion has been developed to a high degree of perfection. The first attempts to provide automatic control for adsorption apparatus resulted in cumbersome arrangements which do not seem to have found

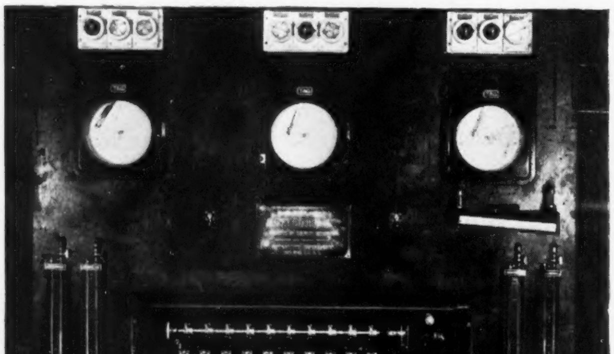
Modern adsorption system extracting gasoline from natural gas carrying 180 gallons per million cubic feet.





An early automatically controlled adsorption system.[5]

acceptance. We illustrate an application of one of these patents[5] of only a few years ago. More recently compact, flexible, simple controlling devices have been designed for this purpose and are in the course of being protected by patents. Two adsorption installations operated fully automatically on a predetermined cycle by a system of control originated by the author have been in successful use for some time, and a third is now undergoing acceptance tests.[6] Automatic operation reduces labor to a mere casual, supervisory, record-taking incident, and by bringing about economies through prevention of waste (each operation is performed at the exact moment required) savings are increased and operating costs reduced to a minimum.



Ten-cam controller at bottom of panel board is brain center controlling the operation of a modern adsorption system recovering fifteen hundred dollars worth of solvents per day.

Truly Wealth from Waste!

The savings to be had by the application of modern adsorption equipment for vapor recovery are at times almost unbelievable. It is hard to comprehend, for instance, how an installation costing, let us say, fifty thousand dollars, can be amortized when recovering gasolene costing 9c per gallon. The fact is that it will have paid all operating expenses and recovered sufficient gasolene at a low enough figure to have returned its cost in two years! The confidence of experienced designers in the processes of recovery perfected by them is so well founded that some will construct and erect such installations at their own expense, without any payment of any sort by the user. The operating and maintenance costs are deducted from the market value of the solvent recovered each month, and the balance is divided between the user and the builder on an equitable basis. For the user this seems to be "Wealth from Waste" at its best.

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1 Herbert, W., Chem. Ztg., 55, 577, 595, 615 (1931).
2 Weissenberger, G. et al., Monatsh. f. Chem., *45*, 187, 281, 413, 425, 437, 449 (1924); Z. f. ang. Chem., *38*, 359, 626, 1010 (1925).
3 Spurlock, B., Trans. A. I. Ch. E., *31*, 575 (1935).
4 U.S.P. 2,022,593.
5 F. P. 753,819.
6 Completed since this was written; efficiency 97.4%.

Synthetic Glass

As a result of a long-term investigation of the manufacture of resin from ketones, the Chemical Research Labs. at Teddington, England, have perfected a new organic glass. Starting with methyl ethyl ketone, which is condensed with formaldehyde to form a keto-alcohol, a polymer of an unsaturated ketone is prepared—through condensation of the dehydrated keto-alcohol—which product is a water-white and light-stable transparent resin. Since the starting materials can be obtained economically at the present time, the Laboratory believes that large-scale manufacture of this resin is practical. The ketone-derived material is said to be machinable and moldable without special apparatus. A history of this chemical research project is presented in British Plastics Magazine, June, '39, p. 35.

Alkali Treatment of Oil Wells

Means of increasing the yield from wells is provided by a method including both acid and alkali treatment of petroleum deposits bearing, in combination, fine-grained siliceous and calcareous formations. After acid has been injected into the rock formation, sufficient alkali-metal hydroxide is introduced to react with and dissolve a substantial amount of the residue left by the first application. Method is covered by U. S. Patent 2,161,085 issued to Solvay Process Co., of N. Y. City.

Resins from Natural Gas

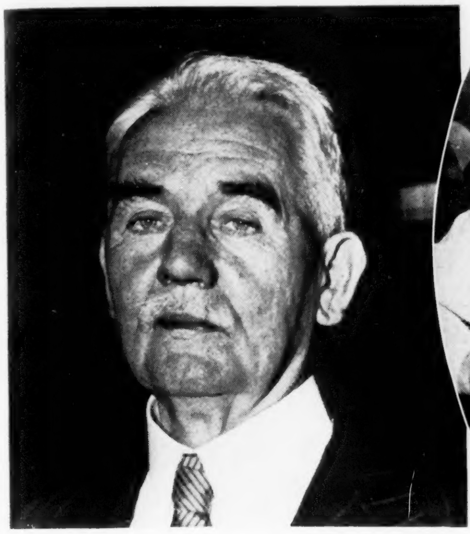
The Texas Co., N. Y. City, has been granted U. S. Patent 2,161,599 for a continuous process converting natural gases, or petroleum refinery gases, into synthetic resins. Method comprises essentially polymerization of the gases to liquid-phase mixtures containing a substantial quantity of aromatic hydrocarbons. Latter compounds are condensed, by the catalytic action of metallic halides, to form resiniferous end-products.

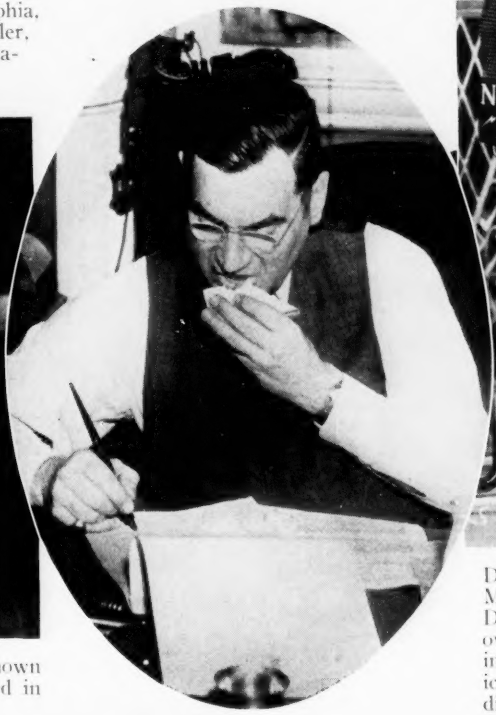
Recovery of Elemental Sulfur

Zahn & Co., G. m. b. H., Berlin, Germany, has been granted U. S. Patent 2,169,379 covering a process for the recovery of elemental sulfur from petroleum hydrocarbon gases. Method comprises essentially passing the gases, admixed with oxygen, through a combustion chamber such that part of the sulfur-bearing material is oxidized to sulfur dioxide, carbon dioxide, and water. Fresh portions of sulfurized gas are mixed with the sulfur dioxide so produced, and the mixture passed over a catalyst at 400-500 deg. C. Under the given conditions, free sulfur, carbon dioxide, and water are the sole products of the reaction, such the catalyst is not contaminated by solid hydrocarbon residues.

"Headliners" In the News

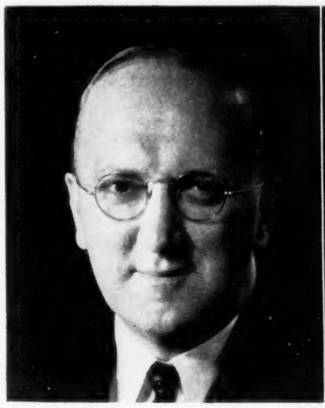
Right, Dr. Robert C. White, well-known chemical specialty manufacturer of Philadelphia, who is that city's highly efficient comptroller, and who is seeking the Democratic nomination for mayor.

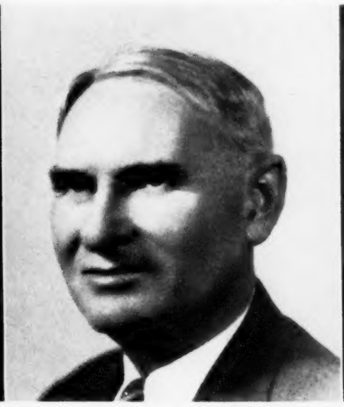


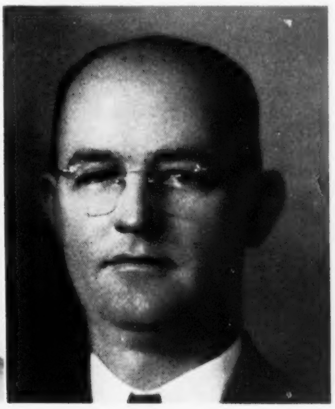


Georges Claude, internationally known French scientist, who recently arrived in this country for a lecture tour.

Dr. Charles Allen Thomas, director of Monsanto's central research department, Dayton, Ohio, who recently dramatized over an NBC network of 60 stations the inside story of why America's vast chemical industry now leads the world in new discoveries and why we are better prepared to keep out of war than any other country.

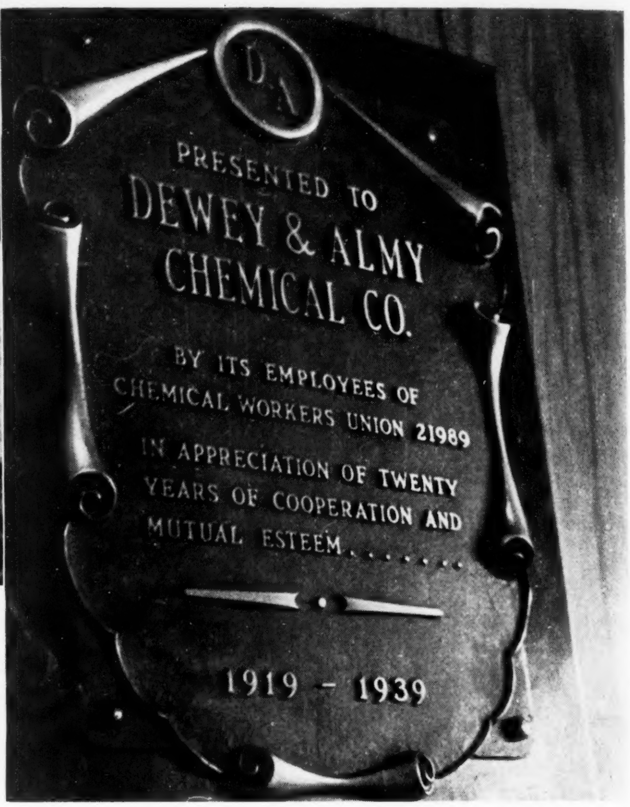






Reading left to right, H. W. Graham, for many years general metallurgist of Jones & Laughlin Steel, who is now director of metallurgy and research; C. C. Henning, the new general metallurgist, who has been with "J & L" for many years; Luke H. Sperry, who is the new chief engineer, Hercules Powder; and W. E. Henry, who takes over Mr. Sperry's old position of superintendent of the chemical cotton plant at Hopewell, Va.

Left to right, Lawrence E. Joseph appointed by Blaw-Knox Company, Pittsburgh, equipment manufacturer, to be executive officer in charge of its Blaw-Knox Division; Thomas H. Chilton, director of Du Pont's technical division of the engineering department, who has been awarded the Chandler Medal by Columbia; George W. Jernstedt, young Westinghouse engineer, who has just been awarded the $1,500 Benjamin Garver Lamme Graduate Scholarship. Award is in honor of former chief engineer for Westinghouse; Louis Ware, who succeeds the late J. J. Watson as president of International Agricultural Chemical.

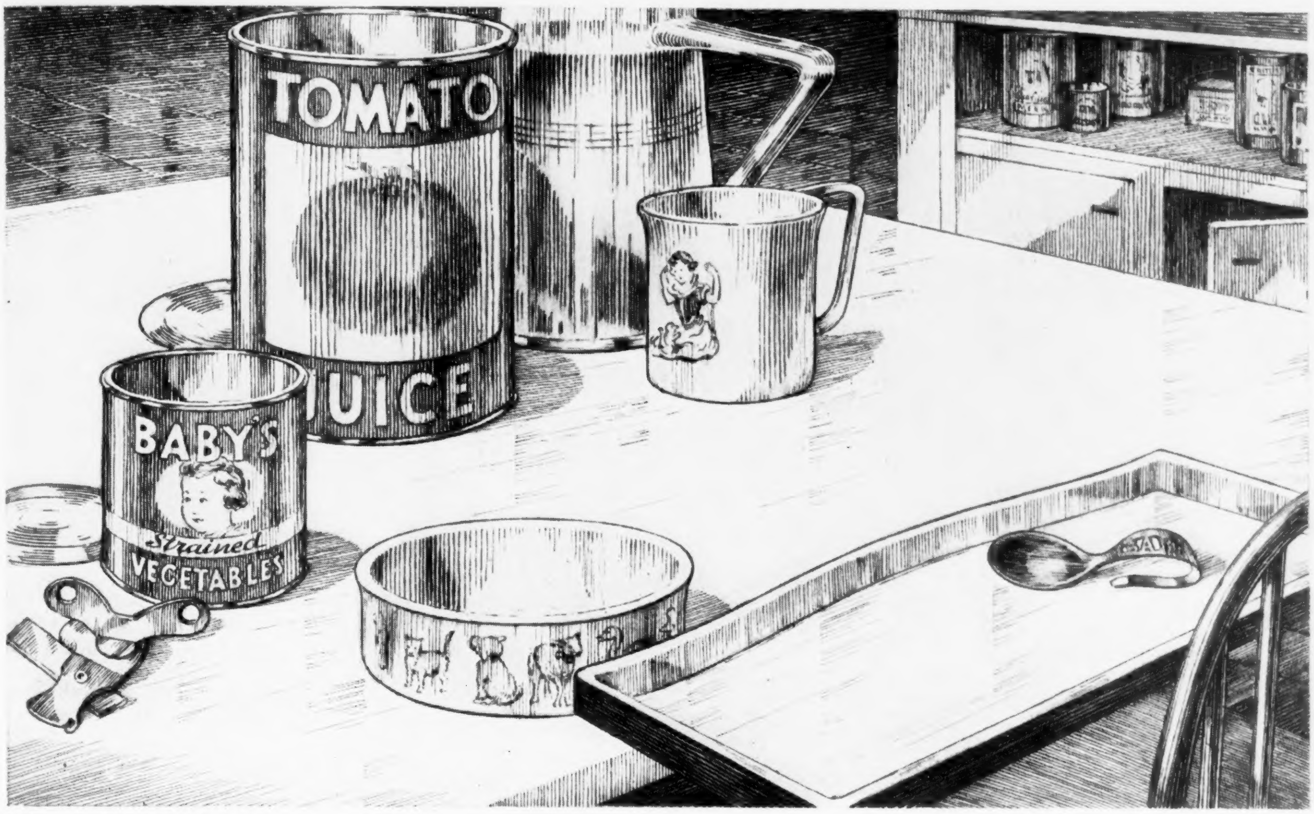


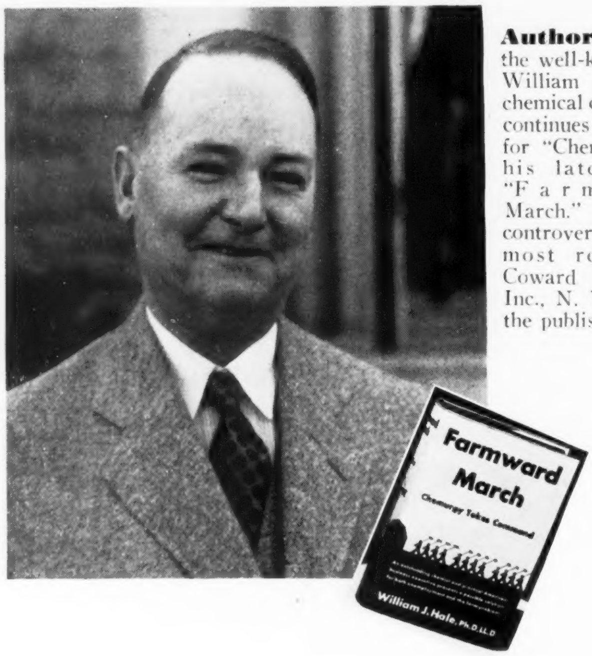
Real Employer-Employee Relations: Bradley Dewey, president, and Charles Almy, vice-president, Dewey & Almy Chemical, Cambridge, Mass., and the bronze plaque presented by their employees last month in appreciation of 20 years of friendly cooperation and mutual esteem.

Safety Record: A chemical company, Monsanto's Merrimac Division, wins the Massachusetts Safety Council's banner for the best safety record in the "Most Hazardous" group for the second quarter of '39. Award is made each quarter to the company in Massachusetts having the greatest number of man-hours worked during the quarter without a lost-time injury. Merrimac's record was 401,839 man-hours for the second quarter, and has been extended through July to a total of approximately 925,000 man-hours since the last lost-time injury. This is the second time Merrimac has won the banner, the other being in the first quarter of '37. Photo shows Osborne Bezanson, production manager, A. L. Gardner, plant manager, and C. E. Sevrens, safety engineer, looking over the prize.

N.Y. World's Fair: Major General Dennis E. Nolan, in charge of state participation at the Fair, and Senator Dan B. Fleming, Commissioner in charge of the West Virginia State Exhibit, formally open display of the smallest metal tube ever produced. With a diameter approximately the size of a human hair and a hole diameter about one-third that size, the tube is made of pure nickel 7/10,000 of an inch thick. Because of its minute dimensions, even the slightest trace of rust might clog up the hole, so a rust-proof metal was essential. An International nickel product.

The dramatic story of how coke, limestone and salt can be combined into a useful synthetic material of many and diverse uses is told to N. Y. World's Fair visitors through this Koroseal manufacturing-fabricating booth in The B. F. Goodrich building.


TOMATO
BABY'S
Strained
VEGETABLES

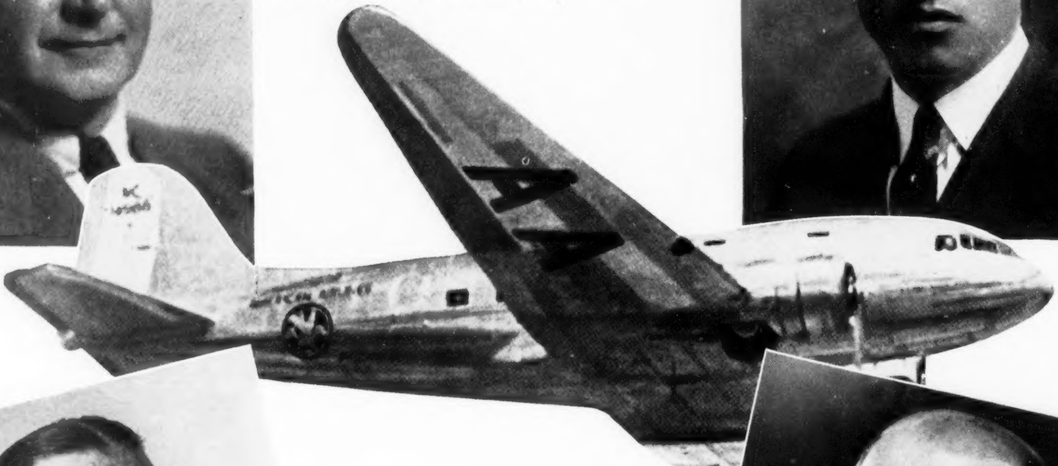


Author: Left, the well-known Dr. William J. Hale, chemical consultant, continues his plea for "Chemurgy" in his latest book "Farmward March." Highly controversial, say most reviewers. Coward McCann, Inc., N. Y. City, is the publisher.

Fair Visitor: Karl F. Wackman, president, Wackman Chemical, St. Louis distributor and manufacturer of chemical specialties, shown sitting in the lounge of the Long Distance Call Demonstration of the Bell Telephone Exhibit, listening-in on calls to various parts of the U. S., while on a recent visit to the N. Y. World's Fair.

Salute the Admirals!

Some of the men in the chemical and allied lines who by reason of having completed 100,000 flight miles on ships of the American Air Lines have been made "Admirals of the Fleet." Left, A. F. Grigon, vice-president, Casein Company Division of the Borden Company; right, A. H. Mathieu, president, A. H. Mathieu, Paterson, N J



Left, W. I. Galliher, vice-president and director of sales, Columbia Alkali; right, R. D. Keim, vice-president, E. R. Squibb & Sons.

Plant Operation and Management

A digest of new methods and plant equipment

Measuring the Combustibility of Gas-Air Mixtures

*By F. Rutledge Davis**

WHERE the Combustible Gas Indicator is Used In the Chemical Industry

- To protect workers before entering tanks, manholes, pits, and other enclosures which have held, or may hold, flammable gas or vapor, and to detect leakage of flammable vapor into such places while work is in progress.
- To make sure of the absence of flammable or explosive gas-air mixture in enclosures or containers before starting work that involves heat or flame or may produce static or mechanical sparks.
- To prevent the accumulation of dangerous vapor concentrations in the rooms and basements of plants using or producing solvents, in the holds and other enclosures on tank ships, and in other places subject to the invasion of flammable vapors.
- To detect and locate leaks in production, storage, and piping systems.
- To trace the source of leakage of flammable liquids, vapors, or gases, into drains and sewers.
- To assist in the control of certain production processes.
- To test liquids of high flash point, like kerosene, for contamination by liquids of low flash point, like gasoline, as during shipment by tank truck or tank ship.

WHENEVER flammable gases or liquids are produced or handled in quantity, it is essential for the protection of life and property to have available some means of detecting quickly and easily the presence of combustible or explosive gas-air mixtures and of measuring accurately their degree of combustibility. In the chemical industry, it is frequently necessary to make atmospheric tests of this kind to safeguard workers and prevent fire and explosion.

For the purpose of making such tests, a number of different instruments have been developed, beginning with the Davy Safety Lamp, which, in modern form, is still widely used in mines and is convenient for certain industrial applications.

Safety Lamp—As is well known, whenever the safety lamp burns in an atmosphere containing a combustible gas, such as methane ("fire damp"), its flame lengthens in a blue tongue called the "cap." The cap becomes noticeable with air containing significant traces of the gas, grows larger as the richness of the gas increases, and extends well to the top of the combustion chamber of the lamp with a gas-air mixture at its lower explosive limit. This behavior gives a fairly accurate indication of the combustibility of a gas-air mixture being tested. Another useful feature of the safety lamp is that it will go out when placed in an atmosphere deficient in oxygen, thus giving warning of a danger that other types of instruments fail to detect.

Burrell Indicator—The Burrell Indicator is typical of a group of testing instruments that has been developed from the technique of gas analysis. It is essentially a U-tube which is partly filled with water. The gas mixture to be tested is drawn into one leg of the U-tube and exposed to the heat of an incandescent platinum filament. If the sample contains a flammable gas, the latter will burn and a reduction in volume takes place. By measuring the reduction in volume, the percentage of the flammable gas in the mixture can be ascertained and the combustibility of the mixture determined.

The Burrell Indicator is a very useful instrument, but it should be operated by a trained technician.

Combustible Gas Indicator—This is a very practicable instrument for ordinary industrial use. With it, a gas-air mixture can be tested for combustibility by a man without technical training in a few seconds, and any desired number of further tests can be made in rapid succession to check the effect of ventilation or to safeguard workers in an enclosure. It is light and compact and is easily carried around by means of a shoulder strap.

To operate the indicator, a sample of the atmosphere to be

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* President, Davis Emergency Equipment Company.


SUBMERGED HEAT EXCHANGERS
built of
Karbate NO. 2
TRADE-MARK
IMPERVIOUS, GRAPHITE-BASE PIPE AND FITTINGS
HAVE 2 OUTSTANDING ADVANTAGES
• HIGH COEFFICIENT OF HEAT TRANSFER
The Thermal Conductivity of "Karbate" No. 2 is 75 BTU per Hr., per Sq. Ft., per Ft., per °F.
Typical Performance Test: Horizontal, multiple tube unit carrying saturated steam at 25 lbs. gauge, immersed in boiling water circulated by free convection.
External area: Tubes only, 23 sq. ft. — Total 34 sq. ft.
Pounds of steam condensed per hour. 413
Heat transfer per sq. ft. of tube area, 295 BTU/Hr./°F
Heat transfer per sq. ft. of total area, 205 BTU/Hr./°F
• HIGH RESISTANCE TO CHEMICAL ACTION
"Karbate" is resistant to reaction with the majority of materials encountered in chemical manufacturing processes, except those of highly oxidizing character. It should not be used at temperatures above 170° C.
Information relative to resistance to specific materials or conditions will be supplied on request.
WRITE
for information on the use of Carbon, Graphite or "Karbate" for heat exchange applications under corrosive conditions and for the storage or conveying of corrosive materials.
NATIONAL CARBON COMPANY, INC.
Unit of Union Carbide UCC and Carbon Corporation
CARBON SALES DIVISION, CLEVELAND, OHIO
General Offices: 30 East 42nd Street, New York, N. Y.
Branch Sales Offices
New York . Pittsburgh . Chicago . San Francisco

With this indicator a gas-air mixture can be tested for combustibility by a non-technical man in a few seconds.

tested is drawn into the instrument through a sampling hose by means of an aspirator bulb. If the sample contains a flammable gas or vapor, a meter will immediately give a reading, showing whether the mixture is safe, dangerous, or actually explosive.

Electrically, the indicator consists of a circuit containing a glowing platinum filament. The gas to be tested is drawn into the chamber containing this filament and, if a combustible gas is present, it burns, thereby increasing the temperature of the filament and also its electrical resistance. This change in resistance alters the flow of current through the circuit, and this change is registered by the meter.

Usual Method of Calibration

The meter is ordinarily calibrated in terms of the lower explosive limit of hydrocarbon vapors. This is practicable because the heat of combustion of a mixture consisting of air and most hydrocarbon vapors is constant at the lower explosive limit. Thus, when a mixture consisting of air with 1½% of gasoline vapor and another mixture consisting of air and 5% of methane are tested by the indicator, the readings in both cases will be approximately the same because both mixtures are at their lower explosive limits. The same holds true of lower concentrations in percentages of the lower explosive limit.

The actual readings of the meter are as follows, 1.00 indicating the lower explosive limit:

0 to 0.2	Safe
0.2 to 0.9	Dangerous
above 0.9	Explosive

When such gases as hydrogen or acetylene are tested, the readings of the meter will not be accurate because these gases do not follow the hydrocarbon heat-of-combustion law. However, the meter readings, for a given gas can be corrected by means of a special calibration curve, or the meter can be specially calibrated for any combustible gas.

For vapor concentrations above the lower explosive limit, readings are made by diluting the sample with air so as to bring its concentration down below the lower explosive limit. A needle valve is available on some indicators for the purpose of determining relative concentrations, but for exact determinations, a special air mixer, providing mixtures of specific gas-air ratios, is used.

A combustible gas indicator of recent design weighs only six pounds and its largest dimension is less than 6½ inches. Operating current is supplied by No. 2 flashlight batteries, which are obtainable anywhere. The meter is of the airplane type, especially designed to withstand rough service.

Continuous Testing Advisable

It is easily possible to arrange an instrument of this type to test the atmosphere at a given point continuously. Air is drawn through the instrument and the meter readings vary as the amount of combustible gas present in the air varies. Such an instrument can keep a permanent record of its readings, and it can also be made to sound an alarm and perform other operations when the concentration of flammable gas or vapor rises above a predetermined danger point.

New Processes

Filters for Alkali A new process fabricating sintered metal filters from powdered meterials is described in D.R.P. 541,515 and 608,122. Iron and nickel powders, obtained by the decomposition of their carbonyl compounds, are sintered in a mold at high temperature; the discs so formed are said to be excellent porous filter media for handling concentrated caustic solutions. By regulating the particle size of the metal, the porosity of the shaped sinter-cake can be carefully controlled. In the case of nickel, it is claimed that a filter body of pore volume up to 90% can be prepared and that, with special care, the quality of Schott glass filters can be reproduced. Filter materials of this nature are used for separating red sludge in the production of alumina from bauxite, and are said to be superior to filter screens of Monel or pure nickel. (Mentioned in *Chemical Trade Journal*, May 19, '39, p. 471.)

New Process For Sodium Peroxide Sodium peroxide is manufactured by a new method, described in E. P. 503,382, wherein the metal and previously prepared metal oxide are treated in a rotary iron furnace with oxygen or oxygen-containing gases, between 300 and 400 deg. C. The furnace is nickel-lined, or may be of nickel sheet construction. Sodium peroxide made by this modified process is said to be particularly stable, and its water solution better adapted for textile bleaching purposes. (Mentioned in *Chemical Trade Journal*, May 19, '39, p. 473.)

Niggeman Benzol Process A pressure process for refining motor benzol is described briefly in *Chemical Trade Journal*, May 19, '39, p. 473. Crude benzol is first washed with 30% sulfuric acid to remove pyridines, washed free of acid, and its temperature raised to 225 deg. C. in an autoclave, at 20-25 atm. When the maximum temperature is attained, the heat is shut off, and the batch held for 4 hours. The product is then rapidly distilled to avoid depolymerization. This, the Niggeman process, is said to be economical but requires modification according to the specific nature of the crude benzol.

Gas Black From Anthracene Rubber-active gas black is obtained by vaporizing anthracene residues in the presence of combustible gases containing 20% or less of carbon monoxide (e.g., coke-oven gas), according to E. P. 500,467 mentioned in *Chemical Trade Journal*, May 19, '39, p. 484. The gaseous mixture is burned in bored elements with limited supplies of air, the black collecting on adjacent cooled surfaces.

Neo-Cupferron New organic precipitant, the ammonium salt of nitrosyl-naphthyl-hydroxylamine, is useful for the direct determination of iron in mineral waters and is expected to become as versatile as Cupferron in its analytical applications. Frederick Smith Chemical Co., Columbus, O., has available a booklet describing the properties and uses of this reagent which, like Cupferron, was introduced by Dr. Oskar Baudisch.

Ferric Oxide Pigments Commercial iron oxide, when precipitated from molten borax, yields a flaky, lustrous paint pigment. Ferric oxide is dissolved in molten, anhydrous borax at 1,000 deg. C., the melt then being allowed to cool to 600 deg. C. in 60-90 minutes. When quite cold, the mass is pulverized and separated with dilute nitric acid, the pigment remaining on the filter. The borax filtrate is evaporated to dryness, and the salt used in the next batch. Details of the method, abstracted in *Chemical Trade Journal*, June 30, '39, p. 608, are presented in English Patent 505,425.

The Pulse of Opinion —

William M. Grosvenor

Consulting Chemist, N. Y. City

The reprint of your recent editorial "Patents Once More," and your news story on the T. N. E. C. patent report is acknowledged.

Your invitation to comment on the past, and prospective activities of the so-called "Monopoly Investigation" committee of Congress is difficult to decline—there is so much to be said. But there is so little use in saying it to or about a committee of which you candidly stated "its hearings may be counted upon to continue, not as fact finding but—for blank attacks upon the American system." Also there is so little use in saying it to men who have "deliberately chosen points, not that they are vulnerable, but that their function in American industry may be easily perverted into causes with a popular appeal."

Bad as our patent system may now be in the opinions of theorists and academicians, their tinkering can do more to ruin its usefulness to inventors, to industry and to national progress and its benefits to the people generally, than all abuses imagined by its would-be reformers.

A. J. Nydick

Attorney, Philadelphia

Demand for a single court of patent appeals is an old story. Bills to accomplish that end were introduced in Congress as early as 1878 and they have cropped up repeatedly ever after. In my opinion, such a court would be undesirable. The judges, I am afraid, would not have the broad judicial perspectives which they now possess, as members of the Circuit Courts of Appeal. If the single court should finally prevail, I certainly hope that its judges will be drawn from the Circuit Courts of Appeal and will not be permitted to sit on that bench for more than two or three years.

John P. Hubbell

Singmaster & Breyer, Chemical Engineers, N. Y. City

The Temporary National Economic Committee report, which was made public on July 16, contains a number of recommendations which, for purposes of discussion, can be divided into two groups: first, changes in Patent Office and court procedure designed to cut red tape and simplify litigation and, second, fundamental changes in the monopoly to be granted to inventors in the future.

The first group are in accordance with the recommendations of the Patent Office and are, in general, advantageous to inventors and engineers.

The proposal to change the monopoly now granted inventors is a horse of an entirely different color. All inventors or potential inventors ought to oppose such recommendations vigorously. To a man of ingenuity, patent protection is as important a fundamental right as anything in the Bill of Rights. Any proposal to emasculate the monopoly which is given to an individual in return for a real invention is an attack on individual property rights, to be resisted in the same way one would resist a restriction on the right to transfer tangible property such as real estate or money.

Opposition, to be effective, ought to be intelligent, and although the patent system as a whole has been distinctly advantageous to the American people, there is no use blinding ourselves to the fact that there must be some fire behind all the smoke of public criticism. To my mind, the difficulty lies in the fact that the patent system is used these days too often to protect ideas or improvements in which the element of true invention is, to say the least, difficult to find. No one begrudges a real inventor the full fruits of his invention, but we all dislike to see an important field pre-empted by a mass of minor patents backed up with a big stick.

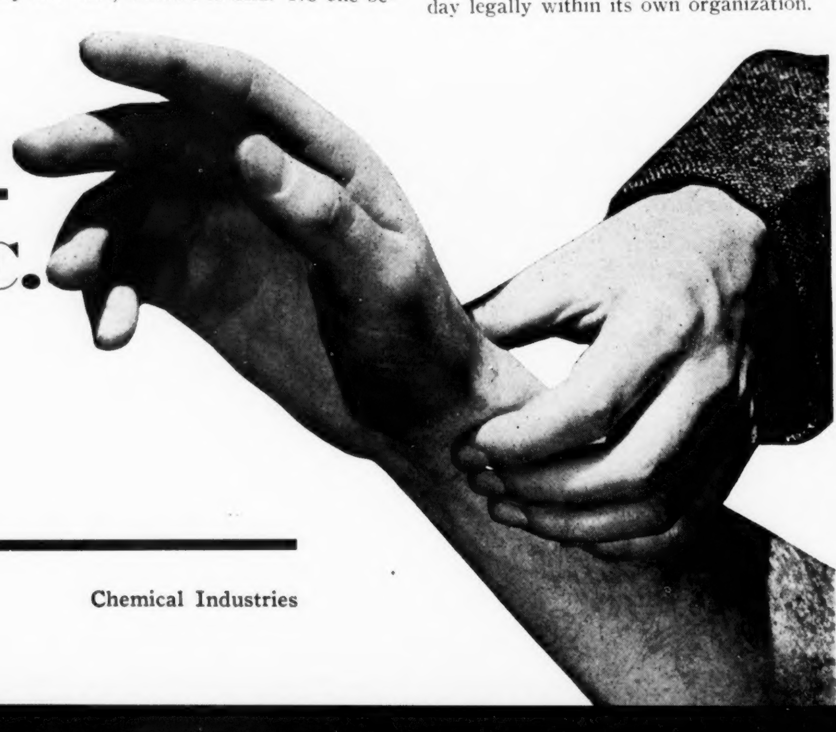
The remedy, it seems to me, lies in a higher standard of invention and more care in restricting claims to the real invention disclosed in the specification. This means strengthening the Patent Office and simplifying patent law. Since patent law is largely made up of decisions in patent litigation, a single court of patent appeals is a necessary first step.

The recommendation of T.N.E.C. that the right to sell or assign a patent be restricted is particularly disadvantageous to the independent inventor as compared with the inventor who is employed by a large corporation. Today, few independent inventors have the means to put their inventions into nation-wide use promptly, and it is notoriously difficult to finance a brand new business on terms which leave an inventor a real share in his invention.

If the proposed recommendation were adopted, such an inventor would be restricted either to organizing a new company to exploit his invention or to selling it to some big corporation with a national market. In the latter case, he would be pretty much at the mercy of the buyer. Another result would be that small companies with local markets would be deprived of access to all improvements not invented by their own employees.

This whole monopoly question is obscured by the legal fiction that a corporation, no matter what its size, is an individual. The proposed restrictions on selling or licensing patents would simply make illegal, for a group of small companies or individuals, another practice which a single big company with branch plants and offices can and does do every day legally within its own organization.

The T.N.E.C. Patent Proposals



Foster D. Snell

Consulting Chemist,
Brooklyn, N. Y.

A manufacturer is very loath to change anything about a product or a process when it is operating satisfactorily. I feel that the present patent system is operating well enough so that there is serious danger that any change will be for the worse rather than for the better. However, perhaps that is merely a sign of old age creeping up.

The arguments against a single court of patent appeals have seemed to me to outweigh those for it. I favor limiting the life of a patent to 20 years from the date of filing to avoid the misuse of privileges occasionally practiced. I oppose a change in the procedure in interferences because the present system gives the litigant greater safeguard. Abolition of renewal applications has merit. I am unable to see any good argument for shortening public use to one year or for reducing the present six months' period for response to office actions. I should much rather see some assurance that the Patent Office would be able to act more promptly than it now does.

The T.N.E.C. sets up a straw man and proposes to shoot him down with restrictions on sale and assignment of patents. That whole group of suggestions seems meritless.

Benjamin Roman

Patent Attorney,
N. Y. City

A single court of patent appeals is most desirable, as it would remedy the existing evil of conflicting opinions and the enormous wastefulness of expense and time in carrying suits to the different tribunals. Incidentally, such a court would be specialized and consist of members actually conversant with the intricate science of patent law, and would thus act as a check on lower decisions which may have been rendered without the requisite learning and experience in this difficult legal branch.

Reducing the life of a patent to 20 years would be a good improvement, as the evil of long pendency and interference in the Patent Office resulted in much injustice in the past and did not help to advance the arts.

The plan to allow but one interference decision in the Patent Office is good, but this should not be rendered by a single examiner, but rather by a board of three members, as such decision is usually too important to be determined by opinion of one person.

Abolishing renewal applications might prove a hardship to poor inventors, and so is not favored, especially as at present it extends the period of pendency only another six months.

Reducing public use period from two years to one year is a good measure as there is no excuse for failing to file a patent application after commercializing of the invention commences.

To shorten the period of responses to Patent Office actions to less than six months would prove a hardship on many applicants and attorneys. Furthermore, this should not be necessary if a patent is made to run 20 years from the date of its application.

I agree most fully with your editorial "Patents Once More," as to patent protection and advertising, but I believe that consumption advertising of liquors, tobacco, chewing gum, and many cosmetics should be abolished. It is enough if we have no prohibition for such articles, but to permit its purveyors to *teach incitingly* an entire nation, particularly its feminine part, to consume such deleterious substances is tantamount to pandering to vice, and constitutes a crime that smells to heaven.

C. M. Palmer

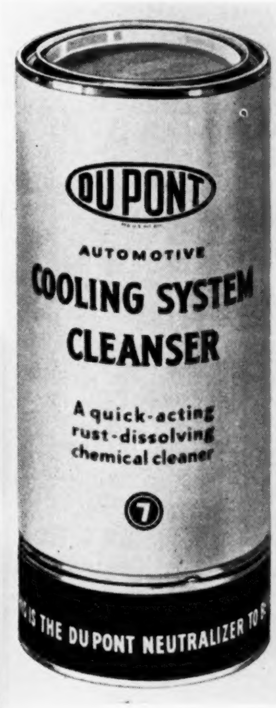
Patent Attorney,
Washington, D. C.

There is no doubt that certain revisions in the existing patent law are necessary.

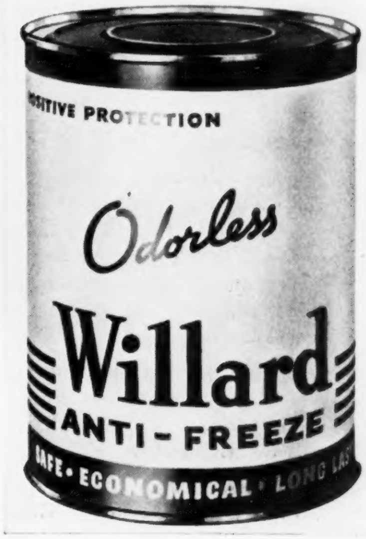
These should be made promptly. Otherwise our *encouraging* policy to stimulate scientific progress and invention will be materially de-accelerated.

New Products—
New Packages

Improved conditions in steel barrel shipments have resulted from sealing the barrel plugs with pipe compound, the Sauereisen Cements Co., Pittsburgh, Pa., reports. Compound forms an airtight seal, eliminating plug leaks, the evaporation of volatile products, infiltration of water, galled threads, and plug corrosion.



Du Pont's new automotive cooling system cleanser is marketed in this two-compartment container. In the upper section is one pound of the cleaning formula; in the lower, a neutralizer. The cleaner is used first. After the system has been thoroughly cleaned and flushed, the neutralizer should be used to alkalize any of the acid remaining in the system. The cleanser should be used while the engine is running.



Willard Storage Battery Company, Cleveland, revamps its antifreeze can preparatory to the new season.

New Equipment

Carboy Pouring Cradle — QC 30

This novel type of safety carboy pourer was designed for the all-aluminum carboy, but the manufacturer has in stock other, similar models for the standard glass carboy. The cradle is of light-weight but sturdy construction, easily handled by one man with complete safety. With the vessel resting on its base, the pourer is placed over the top and clamped securely by means of a threaded handle just below the shoulder. An easy pull on the handle brings the carboy into pouring position; it may be tilted over until the handle touches the floor. The cut shows the carboy in pouring position with its cap removed.

Automatic Distilled Water Control — QC 31

The conductivity of distilled water is usually an excellent criterion of its purity. A manufacturer of process control instruments has recently introduced a simple instrument whereby the conductivity of water, or other electrolytes, can be continuously indicated upon a dial, and so wired that an alarm bell (or automatic valve control) is set in operation when certain limits have been exceeded. For use with water stills, the meter is calibrated in parts per million of chloride ion in conductivity water. The instrument panel is of sturdy steel construction, operating on A. C., and includes a built-in voltage regulator to assure accurate calibration. The cell itself fits into the pipe line or tank whose contents are to be tested, and is wired to the instrument panel which can be located at any distance from the former. An electrically operated valve can also be installed, diverting the fluid from the operating system whenever the impurity limits are exceeded, as determined by the conductivity cell.

Watertight Safety Flashlight — QC 32

A vapor- and water-proof flashlight, enclosed in a very durable plastic case, is now on the market. It is claimed that this lamp operates under water absolutely unaffected by moisture and that it may be used in the presence of explosives and flammable chemicals with safety. The case has no exposed metal parts of any kind, and is impervious to high voltage, acids, oil, and grease.

Chemical Industries
522 Fifth Ave., N. Y. City.

I would like to receive more detailed information on the following equipment: (Kindly check those desired.)

QC 30	QC 33
" 31	" 34
" 32	" 35

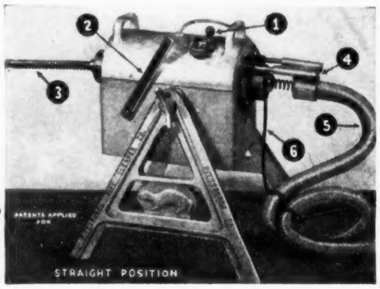
Name ....
Title .... **Company** ....
Address ....

Rust-Proof Scale — QC 33

The scale illustrated is designed to resist rust and the action of acids. All working parts are enclosed in a special alloy housing, made as moisture-proof as possible, with the advantage of a patented oil-spray system which, by a single depression of a plunger, conducts a stream of oil to every working part of the scale. This unusual design is said not to impose a drag on the moving parts, as is usually the case with completely oil-immersed constructions. This model is built on an end tower design, and is claimed to possess greatly increased speed of operation and adaptability to packing conditions, due to that design. The extremely short platter fall minimizes wear and tear on pivots and bearings. Weighings can be made accurately in any normal, out-of-level condition. This scale, available in capacities up to 15 lbs., has no beam, although all weighing operations are done against chrome-plated weights.

Pipeline Cleaner — QC 34

A motor-driven pipe cleaning machine has been placed on the market by a manufacturer of industrial plant accessories. It has wide application industrially, being used for such work as cleaning water tube boilers, oil and gas lines, coils, and the like. Rodding, reaming, and slow digging operations are done away with in building maintenance work.



Ordinary pipe obstructions are cleared up by spinning a length of wire cable within the tubing. Cutting tools are provided for obstinate jobs, such as tree roots.

In the illustration, the salient features are indicated: 1—electric switch reversing rotation of cable, and also for stop and start; 2—clutch handle operating jaws for gripping the cable; 3—outlet of ferret cable to pipes; 4—slip joint connection for rear cable guide; 5—15-ft. guide for slack end of rotating cable; 6—heavily sheathed electric wire, meeting Underwriter's specifications. The jaws can take cable sizes of 1", ¼", and ½".

Rapid Electroplating Kit — QC 35

New device is claimed to electroplate all metals except chromium and aluminum by a method as easy as painting with a brush. Plating compounds, available in nickel, copper, brass, cadmium, tin, zinc, gold and silver, can be directly applied to any surface that has been freed of lacquer, rust, and grease. The plating brush operates on dry cells, or by a transformer-rectifier which plugs into any 110-volt, 60-cycle circuit. The kit, available in several sizes, can be used for quick refinishing of worn, plated surfaces.

New Chemicals for Industry

A digest of products and processes

Sanitizing

By Frederic L. Hilbert

Technical Director,
Shoe and Leather Institute

WATER-REPELLENT, flame-proof, shrink-proof—these are some of the newer sales appeals manufacturers of many types of consumer goods are using today. Add to these "Sanitizing." Textile, leather, paper, felt and fur manufacturers, particularly, will find this detailed description of what "Sanitizing" is and what it will do of special timely interest.

SCIENCE has often been defined as that which teaches us to know, and art as that which enables us to do. Hygiene is generally defined as the science and art of improving health. In this connection the word health is used to indicate soundness of body. Accordingly, hygiene may be rather succinctly defined as the science of health.

In Greek mythology or tradition Hygeia is often referred to as the goddess of health; and is invariably represented as a vigorous young maiden, accompanied by a husky individual, presumably her father or protector. Undoubtedly, it is from this dual symbolical representation of health that the science of hygiene is generally considered to include practically everything appertaining to health, both personal or individual, as well as public.

During comparatively recent years, because of the rapid development of many of its engineering and practical aspects on the one hand and its physiological aspects on the other, there is now a definite distinction or differentiation between hygiene and sanitation or sanitary science. As might be expected, the former is almost entirely in the hands of physicians, while the latter may rightly be considered as being the special province of sanitary engineers.

The foregoing differentiation between hygiene and sanitary science appears to be quite logical, because it really has a more or less sound biological basis. For example, if health or soundness of body is dependent upon the normal functioning of the human mechanism and disease is considered as its abnormal functioning, then it is very easy to visualize that, in practically all cases, diseases or discomforts may be effectively warded off by increasing the general efficiency or vital resistance of the human mechanism and, in the other cases, disease and discomfort may be greatly reduced or entirely eliminated by the proper control of the environment.

From the standpoint of sanitation or, to be a little more precise, sanitary science, diseases are usually divided into two categories; first, those which may be attributed to "defects of material or construction or, again, operating, and, therefore, may be considered as entirely constitutional;" and, second, those diseases which "proceed more directly from external causes, such as mechanical injuries, parasites, poisons, and other conditions which are primarily the consequence of unsatisfactory environmental conditions." As might be expected, those diseases or discomforts which naturally belong in the second category lend themselves quite readily to more or less complete control, by sanitary procedures and processes, while those diseases of the first category constitute the principal province of the physician.

From the foregoing, it is a very simple matter to understand that by the purification of our water supply, the purification and disposal of sewage, the protection of the purity and cleanliness of our food supplies, the maintenance of the cleanliness of our wearing apparel, from hats to shoes, and, as a matter of fact all materials, either natural or fabricated, with which we come in contact, we are actually making use of sanitary procedures and processes. In other words, it is both possible and practical to scientifically control, at all times, our environment and in many ways, protect and preserve the soundness or healthy state of our "fearfully and wonderfully made" bodies.

Sanitary Science Defined

Sanitary science, of course, is that branch of precise, correlated, and organized knowledge which appertains to health and, especially, to that which concerns healthy environment, rather than the health of individuals or persons. In other and simpler words, sanitary science or sanitation, in its broadest application, deals more with public health.

Etymologically, sanitary science, like hygiene, may be simply defined as the science of health; but, as we proceed, it will become more and more apparent that the weapons of sanitary

science are distinctly prophylactic in nature, while those of hygiene are either medicative or therapeutic. In this connection, it is interesting to note that the Latin word signifying "a healthy condition" is *sänus*; from it are derived our common English words sanitation, sanitary, sanify, sanity, etc. One of the earliest words derived from *sänus* is sanity, the original meanings of which were "healthy condition" and "soundness of materials." For example, in the year 1760, H. Brooke, in his book "Fool of Quality" wrote: "Want of sanity in materials can never be supplied by any art in the building."

The word "sanitation" is comparatively new, in the English language. Briefly defined, it is "the devising and application of means for the improvement of healthy conditions." As it is defined today, sanitary science or engineering is the building or the protection and preservation of a healthy environment. Interestingly enough, in the year 1888 there appeared in *Pall Mall Gazette* (August 4):—" 'Sanitationists' (will that be the terrible word?) will contract to supply so much public health per 1,000 for so much a year."

From the foregoing, it is quite natural to assume that there is a need for such a word as "sanitize," which might easily signify "to make sanitary or to disinfect." Although the word "Sanitized," in connection with processes and materials, is used in a somewhat different sense, nevertheless it is very interesting to note that, in the year 1836, there appeared in the *New Monthly Magazine*, the following:—

> "Human industry is God's vicegerent in sanitizing, if I may dare coin a word, the earth we tread, and the air we breathe."

The Sanitized Process

Prior to the close of the World War, Dr. Louis D. Clement, a noted Danish chemist and physician, made the valuable discovery that certain war gases which he had invented were several times more penetrating than hydrogen cyanide and two and three-fourth times heavier than air; and furthermore, they had great soil fertilizing properties. And so it was that, under the magic wand of chemistry, the death-dealing forces of lethal war gases were converted into harmless antiseptic and sterilizing liquids.

The extensive scientific research program inaugurated, fifteen or more years ago, in order to find and perfect practical applications for this new and unusual antiseptic and sterilizing agent was carried out along many lines. The successful culmination of this great research program is attested by the fact that during the last five years many materials have been rendered actively-antiseptic and self-sterilizing (in effect) or, in other words, made to be unsatisfactory media for the propagation of bacteria, during the ordinary life or usefulness of the materials so treated.

When Joseph Lister, the noted English surgeon, about the year 1880, invented the antiseptic method of operation and dressing, a new word was coined: namely, Listerism. As might be expected, there came into existence other terms such as Listerian (antiseptic surgery) and Listerize (to treat according to Listerian methods). In this connection, it is interesting to note that in the year 1902 "English surgeons were Listerizing wounds with great success."

The surname Lister is a variant of Leister; and, accordingly, it is interesting that by the rearrangement of the letters of the latter the word "sterile" is obtained. Furthermore, by the rearrangement of the letters of the word Listerize we obtain the word "sterilize." And from this is obtained the noun sterilizer, which means a substance or apparatus which renders materials sterile. Accordingly, a sterilized material is one which is free from living organisms. An antiseptic is a substance or agent which acts to prevent the propagation of the microorganisms of disease and putrefaction.

When Louis Pasteur (1822-1895), a contemporary of Lister, the son of a humble French tanner and, undoubtedly, the greatest scientist of all time gave to the world his discovery covering the degree of bacteria control in wine, milk, etc., another new word was coined, namely "Pasteurization." The far reaching importance of Pasteur's simple process, which proved that the fermentative changes in fluids could be prevented by raising them to a temperature of from 130° to 160° F., is found in the fact that milk, one of our most important life-giving necessities, has ceased to be an ally of our bacterial enemies.

Obviously, when Louis D. Clement gave to the world a new and scientific means of preventing bacterial propagation in textiles, paper, felt, wool, silk, fur, leather, etc., another great contribution was made to the protection of our health and happiness; and, furthermore, another word had to be coined. From the etymological data already presented, it seems that no better term could have been found than the "Sanitized Process."

The widespread acknowledgment and rapid acceptance of the need for rendering materials actively-antiseptic and self-sterilizing (in effect) has already placed the word "Sanitized" in the category of household words which include "sterilized" and "Pasteurized."

Sanitized Materials

As has already been indicated, the Sanitized process renders many materials, either natural or fabricated, actively-antiseptic and self-sterilizing (in effect); and, by this is meant, they are made bacteriostatic or inimical to the propagation of bacteria or microorganisms in general, due to the controlled antiseptic forces present.

The ultimate value of Sanitized materials is found in the fact that they are not only actively-antiseptic and self-sterilizing but, in most cases, they acquire new qualities which enhance their physical and chemical properties, in respect to the purposes for which they are ordinarily employed. Undoubtedly, a clearer conception of what the Sanitized process is and what it accomplishes may be obtained by considering its application to some of the more common materials with which we daily come in contact, such as leather, cotton, paper, and silk, both natural and artificial.

Sanitized Leather

By leather is meant the tanned hides and skins of many kinds of animals. There are several common methods of converting hides and skins into leather of many different varieties and which can be used for a great many purposes. However, for the present, we will consider only those varieties of leather which are ordinarily used for making shoes, hat sweat bands, and garments.

Undoubtedly, the questions have arisen as to what effect does the Sanitized Process have upon leather and other materials, as well as how lasting are its effects. In regard to leather in general, it improves its mellowness and feel; stabilizes its moisture content; increases its fibre or tensile strength; and, when used for shoe linings, uppers, and innersoles, it prevents the formation of perspiration odors and the destruction of the leather itself, due to the putrefactive decomposition of perspiration brought about by the activity or propagation of anaerobic bacteria. Sanitized leather resists vigorous and sustained brushing without any determinable effect upon its acquired actively-antiseptic and self-sterilizing properties In other words, the sterilizing and antiseptic principles are practically irremovable, under the normal conditions surrounding ordinary wear or usage.

Although the actively-antiseptic and self-sterilizing effects acquired by leather, through the Sanitized Process, are lasting, the Sanitizing agent or principle is present in such an infinitely small amount that it cannot be recovered; and, obviously, from this standpoint alone it must be considered as being non-hazardous. The Sanitized Process does not chemically coat the leather fibres, neither does it combine with or simply impregnate them. And, in this connection, it is interesting to note that according to the "Official Methods of the American Leather Chemists Association" the Sanitized process exhibits no tanning or hide fibre combining properties, either of a physical or chemical

nature. Just how the Sanitized elements are bonded or fixed to the hide fibres is rather difficult to explain, but it is quite certain that they are not bonded or fixed in the sense that they are restrained from acting in the capacity for which they are meant to serve, namely, that of acting as bacteriostatic or fungistatic agent. Naturally, the zone of influence is controlled in such a way that complete surface bacteria and fungi inhibition under normal conditions is assured.

Although the Sanitized Process when applied to leather inhibits the growth of pathological bacteria and fungi, nevertheless its effects are more on the order of prophylaxis, or guarding against diseas, rather than medicative or therapeutic.

The great value of the Sanitized Process in the manufacture, merchandising, and wearing of shoes is so obvious that it requires but little comment. However, several phases of the subject should be given some consideration. In the first place, it is a very simple matter to conceive that an ordinary shoe or, in other words, one not made of Sanitized materials even under normal wearing or storing conditions is an unusually satisfactory medium or dwelling place for bacteria and fungi, of almost every description. Even when the shoe is removed from the foot, the leather, cotton linings, and other materials are susceptible to bacterial invasion and subsequent deterioration, due to the absorption of putrefying perspiration.

Perspiration a Natural Function

Although perspiration is a natural function of the human body, nevertheless it is very often the cause of much annoyance and discomfort unless it is more or less completely or normally excreted or discharged. On those parts of the body which are ordinarily exposed to the air, perspiration is quickly discharged, due to evaporation and the action of aerobic bacteria. On the other hand, perspiration when confined, as it is in our shoes or certain parts of the body, undergoes putrefactive decomposition due almost entirely to the propagation of anaerobic bacteria. The products of putrefaction are absorbed and retained by the clothing and naturally give rise to perspiration odors.

All kinds of bacteria require oxygen for their growth or propagation. The aerobic bacteria obtain their supply of oxygen from the air while the anaerobic obtain their requirements from the media upon which they feed. From this it is easy to visualize that while shoes are being worn the conditions are perfect for the propagation of anaerobic bacteria. On the other hand, while the shoes are off the feet, both aerobic and anaerobic bacteria may propagate. As a matter of fact, there are some bacteria which are both aerobic and anaerobic. In other words, shoes, because they cannot be washed or dry cleaned, are at all times the "happy hunting grounds" for all kinds of bacteria, fungi, and molds.

Leather which has been subjected to the Sanitized Process is rendered bacteriostatic and fungistatic; and, therefore, inimical to the propagation or growth of bacteria and fungi.

Sanitized shoes wear longer; they are more comfortable, because they resist the putrefactive decomposition of absorbed perspiration, which is an exothermic chemical reaction; and, furthermore, they are free from perspiration odors. One of the most natural uses of the Sanitized Process is the rendering of leather used for hat sweat bands actively-antiseptic and self-sterilizing.

As has already been stated, although Sanitized leather remains bacteriostatic for an indefinite length of time, the actively-antiseptic and self-sterilizing principle or agent is present in such an infinitely small amount that it cannot be recovered; and, from this standpoint, it must be considered as being non-hazardous. For example, in connection with the use of over 25,000,000 Sanitized hat sweat bands, made of vegetable-tanned leather and worn in many parts of the world, the question of allergy has not come up once. This, of course, is very interesting and significant, because it has been determined that two per cent. of the wearers of hats are allergic to vegetable-tanned leather. Although the Sanitized Process renders the hat sweat band, shoe lining, and garment leathers actively-antiseptic and self-sterilizing, in effect, it has no medicative or therapeutic action.

Sanitized Textiles

It has been known for many years that cotton fabrics often deteriorate, losing their tensile strength and other good qualities; but only during comparatively recent years has it come to be generally known that the principal if not the only reason for this is to be found in bacterial activity.

According to a report of the Textile Foundation, October 4, 1934, Bruce Prindle, of the Massachusetts Institute of Technology, found that "on a single gram of raw cotton fibre there were 500,000 to 2,000,000 bacteria, and 1,000 to 5,000 molds." Fortunately, none of the bacteria were found to be of a disease producing variety. However, like many varieties of bacteria, which feed on carbohydrates, they directly attack the fibres. Although the destruction of raw cotton fibres and woven fabrics is now known to be due, to a great extent, to biological agencies, very little, however, is known about their microbiology.

It is quite possible that bacteria may get on the fibres even before the cotton bolls are open; and, consequently, insect punctures and the growth of molds might bring about an early infection. However, as in most cases, the bacterial contamination is most likely to be due to dust and the careless handling of the ripe cotton fibre. At any rate, it is quite obvious that microorganic life is abundantly present in the cotton fibre, even before it is handled in the cotton mills.

What is true about cotton is equally true about silk. The "silk worm disease" which almost obliterated the silk industry of France was found by the great Pasteur to be due to bacterial activity. However, the point is that all vegetable fibrous matter either in the raw or fabricated state is susceptible to deterioration by bacteria, fungi, and molds. Even synthetic products, such as rayon or acetate silk, have no inherent bacteria-immunity and are, therefore, to be classified as carriers of microorganisms even to as great an extent as natural cotton or silk.

Practically all the articles identified with our daily life are amenable to being made actively-antiseptic and self-sterilizing, in effect, by the Sanitized Process. A few of the Sanitized materials and articles which are now in common use are textiles of all kinds in the form of handkerchiefs, scarfs, hat linings, coat linings, shoe linings, felt hats, draperies, curtains, mattress and pillow ticking, mattress covers, carpets of all kinds, hooked rugs, comfortables, baby linen, bed linen, towels, mats, spreads, paper tissues for the face and personal hygiene, and last, but by no means the least, gauze bandages and paper food containers.

As has already been indicated, the actively-antiseptic and self-sterilizing principles are present in Sanitized materials in such small amounts that they are irrecoverable; and, accordingly, their presence cannot be detected by any ordinary physical or chemical methods. Furthermore, they do not interfere with the physical or chemical properties of the material and furthermore they do not affect the physical or chemical constants of the materials, when analyzed by the usual methods employed for each material.

The tests used for the determination and control of the actively-antiseptic and self-sterilizing properties of Sanitized materials are based upon those employed by the United States Government, for the evaluation and standardizing of antiseptics. The following known as the "Halo System" is, for our present purpose, the most interesting and valuable.

METHOD "A"—ANTISEPTIC TEST
(Halo System)

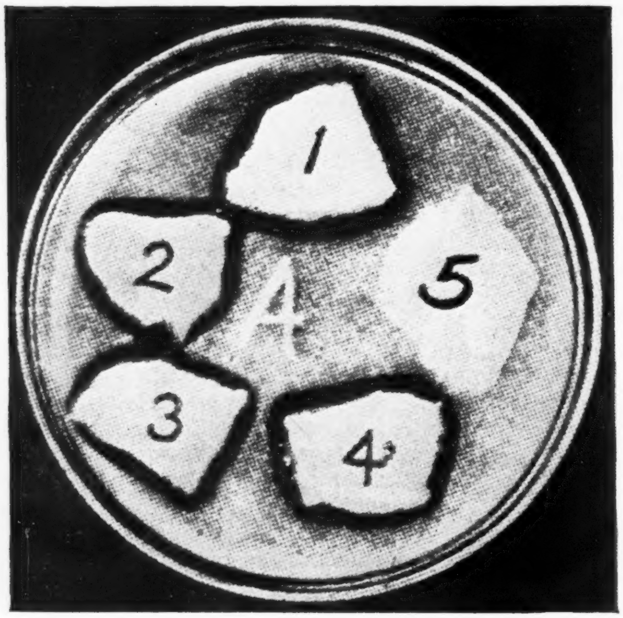
Agar Medium of a pH of about 6.8 but never more than pH 7.0.
Sanitized sample to be tested about 1 square inch.

Test Organism: Staphylococcus aureus, virulent strain, in an 18-hour culture, diluted with broth or a physiological saline solution to approach one billion organisms per cubic centimeter. One cubic centimeter of this solution is mixed thoroughly with 9 cubic centimeters of liquid agar at a temperature of 44° C. The petri dish should be kept at the same temperature to prevent the agar from solidifying. The agar is then

poured into the petri dish to a thickness not greater than 1 to 1½ millimeters. The thinner the layer of agar the clearer the test will come out.

The sample to be tested is immersed in the agar while the agar is still liquid, in order that the saturation of the material may be as complete as possible.

The agar is allowed to solidify in the petri dish, and then the petri dish is placed in the incubator. The petri dishes are removed and the results determined, after a sufficient period of incubation.



The accompanying photograph may be considered as a practical representation of a standard bacteriological test, carried out in accordance with the foregoing United States Government method of determining the strength and efficacy of antiseptics.

The test pieces marked 1, 2, 3, and 4 were treated according to the Sanitized Process used for leather and other materials. Test piece 5 was not treated, in any way.

Samples 1, 2, 3, and 4 exhibit well defined "halos," while sample 5 shows no "halo"; but, instead, it shows profuse bacterial invasion. These tests prove quite conclusively that Sanitized materials not only control the bacterial life present, but they also control pathogenic organisms (disease virus) deposited on them, as and when contact with human exudates is established.

When materials are rendered actively-antiseptic and self-sterilizing, in effect, by the Sanitized Process and tested according to the foregoing method, they invariably show narrow "halos" or areas intolerant to bacterial propagation. This indicates that the actively-antiseptic and self-sterilizing principles are firmly bonded and fixed; and, therefore, do not readily leave the Sanitized material, or diffuse into the surrounding agar. Such Sanitized materials may be tested or replanted an indefinite number of times and still continue to show the same resistance to bacterial invasion.

Materials treated with ordinary antiseptics, when tested according to the foregoing method, often give large or wide halos,—and even small pieces—one-half a square inch or less may clear the whole plate. Tests of this character indicate that the antiseptic agent is not controlled or firmly bonded or fixed in the material; and, therefore, diffuses quite readily out of the material into the agar. When such test materials are replanted, it will be found that the zone or "halo" of inhibition diminishes with great rapidity and soon disappears entirely, thus indicating that the antiseptic agent is very lightly fixed and, therefore, quite lacking in lasting or efficient properties.

The new and remarkable actively-antiseptic and self-sterilizing properties of materials, treated by the Sanitized Process, depend upon the fact that the zones of internal and surface bacterial inhibition are scientifically controlled and that they function throughout the normal life or use of the materials as bacteriostatic agents.

New Products

Tar Stain Remover New colloidal solvent is claimed to have an exceptionally high solvent power for tarry fuel oil stains. Compound, of the "Gunk" type, includes a protective colloid so that the cleaner cannot discolor hard paint and lacquer finishes on which it may be used many times without harmful effect, according to the manufacturer. Solvent is recommended for cleaning out tank trucks, cars, and buses.

Carnauba Wax Substitute New wax preparation is reported to be an excellent substitute for the more expensive Carnauba wax, and has already found valuable use in the manufacture of secondary or one-time carbon paper, wax emulsion and wax paste, and in the treating of leather and wood. Compound is a product from the plant of one of the best-known refiners of waxes.

Rust-Resistant Finishes for Magnesium Alloys Two coatings for magnesium alloys, such as are used in the fabrication of aircraft, have been perfected by a leading manufacturer of magnesium alloys. Both materials are resistant to salt water corrosion, and are said to be superior to other known methods of protection against saline exposure. These finishes are designed as primers for subsequent paint applications, and are claimed to introduce no dimensional changes in parts machined to fine tolerances.

Joint-Sealing Compound A flexible, non-hardening gasket and joint-sealing compound has been placed on the market by a manufacturer of radiator specialties. Product, known as "Titeseal," prevents water, steam, gas, oil, and anti-freeze leaks, yet is reported to remain in a plastic condition at all times, permitting easy disassembly.

"UltraKote Synthetic" Tough, porcelain-like, flexible finishes on any production metal can be made with this new enamel, according to the formulator. Surfaces treated with this finish are said to be extremely hard to chip, yet the latter will not crack even though the metal surface be bent double. "UltraKote," available in every color, can be applied by spray, dip or roller coat machine.

Lacquer Retarder An anti-blush for nitrocellulose lacquers has been prepared to prevent blooming during very humid weather. This retarder is said to be effective in all types of nitrocellulose lacquers, having a wide resin tolerance and excellent compatibility with almost all lacquers.

"Galv-A-Niel" Product is a one-treatment, degreasing primer for galvanized metals that are to be painted. The cleanser also builds up a surface film producing an excellent bond for paint films. Galvanized sheet, or other material high in zinc, is said not to be exposed to corrosion, when first coated with this concentrated (one part "Galv-A-Niel" to 3 parts water) zinc primer, claimed to make impossible the blistering of the painted surface.

Month's New Dyes Diazo Fast Bordeaux FBL produces on cotton and viscose rayon bordeaux shades which have a slight blue undertone. It is claimed to have good dischargeability and to be easily soluble, possessing good fastness to washing and water, with moderate fastness to light. Palatine Fast Black GGN, a greenish black, is said to be of excellent fastness to perspiration, light, and general wear, and is recommended for machine dyeing because of its good solubility and leveling properties.

Chemical Specialties for Industry

A digest of new uses and new compounds

INDUSTRIAL PRESERVATIVES

By Benjamin Levitt

MR. LEVITT, well-known Philadelphia chemical consultant, in a sequel to his article on "Oxidation Inhibitors," which appeared in the August issue, now discusses ways and means of combating organisms, and reviews in detail the literature on this highly important subject.

THE present subject cannot be discussed completely, without touching on such topics as antiseptics and germicides. M. V. Ball, Essentials of Bacteriology, gives the following definitions, which are relevant to the subject: 1. Preservatives are substances which prevent fermentation, but they are not always germicides. 2. A germicide is an agent capable of destroying bacterial life. 3. An antiseptic solution or substance is one that can inhibit or prevent the growth of bacteria without necessarily destroying them. 3. A disinfectant must be germicidal. 4. A deodorant may have no germicidal or antiseptic properties.

Industrial Process Bacteria

A number of industrial processes depend on the action of bacteria, yeasts and molds, for example, the fermentation industries, the manufacture of cheese, growing mushrooms. In 1914, the U. S. Department of Agriculture discovered that *aspergillus niger* produces citric acid from sugar and that the concurrent production of oxalic acid, could be suppressed. In these cases, the micro-organisms are vital to the manufacturing processes.

Destructive Organisms

On the other hand, industrial chemists know that many organic materials are decomposed by molds and bacteria. The presence of organisms in foods, cosmetics and many industrial products, is a serious detriment. For instance, foodstuffs turn moldy, oils become rancid, cosmetics may develop unpleasant odors and discoloration, and emulsions sometimes break, due to microbial activity. Destruction of goods, as pointed out above, causes serious losses, and is of great concern to the manufacturers.

Means of Combating Organisms

Where possible, pasteurization or even boiling the materials inhibits bacterial decomposition, for a certain length of time, but these measures are not always a sufficient guaranty against the ravages of time, and so, chemical ingenuity has developed a number of materials which act as preservatives, that are quite permanent.

The ideal preservative should be non toxic and non irritating. Furthermore, it must be compatible with the materials in which it is used. It should impart no objectionable odor or color. Where used in an emulsion, it should be soluble in either the oil or the water phase, and preferably in both. It should be effective in very small amounts. The following are some of the best known preservatives.

Nipagin, Solbrol, Moldex, Tegosept, Methyl Parasept, are trade names for the methyl ester of parahydroxybenzoic acid. Nipasol is the propyl ester of p. hydroxybenzoic acid. Nipacombin A, is a 6:4 combination of the propyl and ethyl esters of p. hydroxybenzoic acid sodium salts. Moldol is a mixture of sodium benzoate and benzoic acid. Paragerm is methyl-propyl-diphenyl-p-oxybenzoate. Microbin, is sodium p. chlorobenzoic acid. Solbrol M. is the methyl ester of p. oxybenzoic acid, and Solbrol P. is the propyl ester of the same. Butoben is normal butyl p. hydroxybenzoic acid. Collotone is p. chlorometacresol. Shirlan is salicylanalide and Shirlan NA is its sodium salt.

Others are, amyl-m-cresol, betanaphthol, chloral hydrate, chlorobutanol, chlorothymol, hydrogen peroxide, mercuric chloride (corrosive sublimate), ortho-phenylphenol, oxyquinolinsulfate, paraformaldehyde, p-chlor-metacresol, p. chloro-meta xylenol, phenol, phenylmercuric nitrate, phenyl salicylate, picric acid, resorcinol, salol, sodium benzoate, thymol, carvacrol, oil of cloves, methyl salicylate, zinc chloride, zinc sulfate, borates, iodates, free chlorine, hypochlorites, fluorides, formic acid, and the sweetening agents dulcin and saccharine.

Selection of Preservative

The selection of a preservative depends on the type of micro-organism encountered and also upon the type of material in which it is to be used, and upon the purpose for which the final product is intended. No single preservative therefore, can be used with equal efficiency, for every purpose. Although an antiseptic is always a preservative, still, one antiseptic may be more bactericidal than another, for a given strain. It therefore behooves the manufacturer to use the best preservative for the purpose intended.

In private correspondence with one of the manufacturers of preservatives, the author was advised that, of the methyl, ethyl and butyl esters of p. hydroxybenzoic acid, which they have prepared, they found that the butyl ester is the most effective. They found that 8 grams of the methyl ester, and 5 grams of ethyl ester replace 10 grams of benzoic acid, while only 1 gram of the butyl ester is required to replace 10 grams of benzoic acid.

Following is a table of comparison of several preservatives, published by Merck & Co. They are all odorless, white crystalline powders, non toxic and stable in air.

Chemical Name	Butoben n-Butyl Parahydroxy-benzoate Merck	Benzoic Acid	Sodium Benzoate	Salicylic Acid
Solubility				
Water	1 Gm. in 5000 cc.	1 Gm. in 275 cc.	1 Gm. in 1.8 cc.	1 Gm. in 460 cc.
Alcohol	Readily Soluble	1 Gm. in 2.3 cc.	1 Gm. in 47.5 cc.	1 Gm. in 2.7 cc.
Effective concentration (as a preservative)	0.02%	0.1—0.2%	0.1—0.2%	0.2%
Type of media in which effective	Acid Neutral Alkaline	Acid	Acid	Acid
Type of preparation for which usually used	All types of liquid preparations, including face lotions, hand lotions, wave set, and cosmetic creams. Also elixirs, tonics, eye lotions, and emulsions.	Face lotions, wave sets. Also elixirs, tonics, and emulsions.	Food products and fruit juices.	Wave sets, elixirs, and tonics.

In experiments of L. Freund-Prager *Tierartzl. Arch.* p. 93-6—1934, he states that a mixture of 60% ethyl and 40% propyl esters of p. hydroxybenzoic acid was tested by feeding to rabbits in an oil emulsion. The esters were found to be less toxic than the free acid, and therefore more suitable as preservatives.

Tilgner and Schillak—*Przemysl Chem. 21,* p. 329-46—1937, state that ethyl p. aminobenzoate is best suited as food preservative. It is a powerful killer of micro-organisms, has little effect on taste, good solubility and negligible effect on higher organisms. They find further that benzoic acid has better solubility, but is unequal in preservative strength. They describe the methyl ester as being low in preservative strength and that it has a bad taste. The propyl ester is difficult to use on account of its low solubility.

Esters Prepared Abroad

A most unusual statement by these researchers, is that the esters prepared in Poland have a better taste than those prepared abroad. This, they infer, is because their own compounds have been more carefully prepared. Although the present author doubts the veracity of the above statement, our own manufacturers are hereby urged to take note.

The propyl ester of p. oxybenzoic acid is suggested by its makers as especially suited for preventing fermentation in herb juices, raw fruit juices, aqueous extracts, albumin, starch solutions and vegetable mucilages. It also protects oils, fats and salves from rancidity. Its destroying effect on staphylococcus, showed that it has 15 times the effect of phenol. One tenth per cent. of this chemical is used.

The methyl ester of p. oxybenzoic acid is soluble in hot water 1:5000 and in fats 1:40-50, in alcohol 1:5. It has a phenol coefficient of 2.6 in destroying staphylococcus. It is recommended for preserving syrups, pharmaceutical extracts, malt extracts, vegetable slime, rubber, gelatin solutions, emulsions, electuaries and starch paste. It protects oils, fats, ointments and soaps from rancidity, and prevents the formation of hyphomycetes and bacteria. It may be used for preserving colored solutions, weak alcoholic hair tonics, toilet waters and cosmetics. It is used in concentrations 0.007% to 0.15%.

According to U. S. Patent 2,100,803, crystalline addition products of 4-amino biphenyl and benzoic and salicylic acids may be used as preservatives. These however, are unsuitable for use in foods.

French patent 813,035 describes methyl or ethyl formate as useful in destroying parasites, and for preserving dried vegetable materials and foodstuffs. The formates may be used as such, or as colloidal solutions.

A. M. Platow—*Chemist-Analyst*—June, 1939, describes the use of sodium furoate as a preservative for analytical solutions.

Thymol(2-isopropyl-5-methyl phenol) and its isomers possess the power to kill and inhibit the growth of bacteria and fungi. They are useful as antioxidants and preservatives. Thymol itself has a phenol coefficient of 28 against *E. typhi.*

Isothymol (3-methyl-5-isopropyl phenol) dispersions, 4 parts in 1 part Albasol A. R. by weight, gave a phenol coefficient of 24.4 on *E. typhi* and 40 on *Staph. Aureus.* The sodium salts of thymol and isothymol are almost odorless and have effective preservative action.

Carvacrol (2-methyl-5-isopropyl phenol), has been recommended by its producers as a preservative for textile soap, gum solutions, etc., against mold. They suggest the addition of 1%. It is only sparingly soluble in water, and should therefore be dispersed or dissolved in a suitable solvent to render it soluble or miscible in aqueous solution. It has a phenol coefficient of about 25. A disinfectant prepared from 25 parts carvacrol and 75 parts 2½% aqueous solution of gum Ghatti, and then passing the mixture through a colloid mill, shows a phenol coefficient of 6.1 when tested against *E. typhi* at 20° C.

Para-chloro-meta-cresol, is an effective preservative, which is recommended for tanners' soaking solutions. Experience has shown that a 1% solution will kill anthrax in 20 minutes, and that a ¼% solution will kill anthrax in 4 hours. This chemical prevents loss of hide substance, when used in soaking baths to the extent of ½% solution. In soaking of furs, a 0.05% solution prevents hair slip.

As a preservative for glue, 1 to 2 pounds per 1000 lbs. is recommended. For inks, colors, and paints 0.1% to 0.2% is required for complete preservation. For preserving blood, casein, flaxseed, moss and the like, about 1 oz. in 5 to 10 gallons is sufficient.

Amyl-m-cresol is very sparingly soluble in water (1 in 30,000). It has a R. W. coefficient of about 250 when tested against *B. typhosus.* As a preventive of mold, a 1:30,000 solution controlled *sterigmatocystis, aspergillus, penicillium* and *Thomnidium.*

Pentachlorphenol is used as a preservative for wood and glue. One part to 400 parts of glue is effective. Wood is protected by immersion or by brushing with solutions of 5% in petroleum oil. This is used for sap stain control. The chemical may be used to control slime and algae in industrial cooling systems and for protection of pulp, paper, starches, dextrines, gums, and in the preparation of fungus resisting paints and for weed control.

Sodium-3-chlor-4-hydroxydiphenyl and sodium orthophenyl phenol sold under the trade name of Dowicides, have high germicidal value and are recommended as preservatives for glue, etc.

Methyl salicylate is used in silk throwsters' soaking baths as an inhibitor of mildew on silk.

Use of Chloroform and "C. T. C."

The National Formulary suggests that chloroform and carbon tetrachloride be added to vegetable and animal substances as a means of preserving them from the ravages of insects. The use of suitable preservatives in adequate amount is required in ampul solutions, that are not self-sterilizing.

References:
Essentials of Bacteriology—M. V. Ball.
Chemical Analysis of Food Products—M. B. Jacobs.
Chemical Abstracts.
Givaudanian—July 1939.
Modern Cosmetics—Chilson.

The Specialty Maker's Plant Notebook

By Charles S. Glickman*

Leather & Floor Finishes: A new flexible shellac in solid form and able to impart a high degree of non-slipperiness and resiliency as well as added wear resistance to emulsion floor polishes will soon be available on the market. This product is also suitable for use in leather finishes where its extreme flexibility will serve to great advantage.

Water Emulsion Polishes: Several new alkaline organic compounds are now being tested with a view towards their use in wax polishes. It is hoped that they will be able to replace available but much more costly organic alkalies. Their low molecular weight (lower than present compounds) will also effect a considerable saving in formulation.

White Shoe Polishes: A new aliphatic ester, odorless and non-decomposing and suitable as a suspending agent for pigments in white shoe polishes is now available. This interesting product imparts a considerable degree of adhesiveness and also acts as a detergent. Its water solutions are white and neutral in reaction making them harmless to leather.

Solvent Wax Polishes: A new development in this well-known type of product that is based upon the use of balanced wax-resin blends results in products of exceptional wearing properties, high lustre, and complete freedom from tackiness. These products yield negative Liebermann-Storch reactions upon test.

Floor Cleaners & Soaps: A new non-alkaline general purpose cleaner and detergent that claims complete freedom from soaps, fats, oils and solvents, with a pH of 7, colorless and odorless is now being offered to jobbers of sanitary supplies. It is further claimed that this new product, harmless to the skin and to the surface being cleaned, is at least 10 times more powerful in cleansing and lathering action than 40% liquid coconut oil soap.

Equipment: A new process for the manufacture of emulsions containing waxes is being perfected. It is claimed that this new process will eliminate costly and bulky equipment by means of an atomization principle based upon certain critical factors of temperature and pressure.

Printing Inks: Considerable savings in the manufacture of varnishes used in the manufacture of printing inks are now being effected by means of a new "synthetic" substitute for carnauba wax which is based upon the use of balanced mixtures of carnauba wax and certain synthetic resins. It has been further determined that these inks so prepared are superior in certain respects to inks prepared with carnauba wax alone.

Automobile Polishes: Greater performance qualities in automobile polishes, especially those of the non-abrasive type, have been attained by the use of resin (synthetic) blends with waxes. The degree of gloss and the resistance to wear have been improved by their use.

Disinfectants: A new series of organic compounds in solid form, and of a variable range of coefficient, soluble in water or organic solvents is now available. These products range in color from white to black and in most cases are very faint in odor. Phenol coefficients (F. D. A. method) obtained with these products (certain of them) range as high as 18.

Information regarding any or all of these products or processes are obtainable upon request by writing to CHEMICAL INDUSTRIES.

* Technical Director, Manufacturers Testing Laboratories, N. Y. City.

Booklets & Catalogs

Chemicals

A86. A Working Knowledge of Insecticides and Fungicides is a pocket-sized, 24-page manual that should be of genuine helpfulness and find much practical use, for even the amateur gardener will want to have it. General Chemical Co.

A87. Dicyandiamide and Guanidine Compounds, an absorbing chemical history of the "Dicy" family of guanidines, manufactured by American Cyanamid & Chemical Corp.

A88. Industrial and Pharmaceutical Chemicals, an up-to-date list of unusual and special chemicals distributed by R. W. Greeff & Co.

A89. Kodak, July; naturally, snapshots from here and there are in profusion, but the Eastman Kodak news and editorial content is excellent. Eastman Kodak Co.

A90. National Engineering Products, 12-page folder of information on the Distributed Blow-Off System, featuring the cement and packing compounds Copaltite, Rustnil, Rodpax and Tempseal. National Engineering Products, Inc.

A91. The Neoprene Notebook, No. 17, is the third in a series entitled "The Manufacture of Industrial Products from Rubber and Neoprene," describing the mixing and calendering of rubber and neoprene with plasticizing compounds and other conditioning materials. Du Pont.

A92. Petroleum Products for Leather, one of the "Esso" looseleaf folders, describes and illustrates the use of leather oils in the finishing of light and sole leather. Folder is a member of the "Lubetexts" issued by Standard Oil of N. J.

A93. Price Catalog of "Baker's Analyzed" C. P. Chemicals and Acids, July; 64 pp. presenting, in compact form, the familiar line of reagents by the J. T. Baker Chemical Co.

A94. Priorities, August, takes a glance at machines in their relation to unemployment, and analyzes briefly some aspects of the patent system. Both editorials bring a fresh view-point to these current topics of discussion. Prior Chemical Corp.

A95. Products and Prices describes the special reagents for the heavy industrial laboratory, prepared by the G. Frederick Smith Co.

A96. R & H Chemicals, Quarterly Price List (July), new prices and new chemicals from the R & H Division of the Du Pont Co.

A97. Silicate P's & Q's, August leaflet, devotes its columns to the fine work of Miss Frances Suarez, one of the outstanding women in the advertising field, a leader in chemical advertising. Philadelphia Quartz Co.

A98. "Tennessee" Ferric Sulfate, folder announces the availability of this stable, cold-water soluble ferric salt in bulk—400-lb. barrels. Tennessee Corporation.

A99. Wood Preserving News, July, contains the 1938 data on treated wood, as compiled by the U. S. Forest Service and the American Wood-preservers' Association.

A100. The Aristocrat of Starches, 8-page folder, describes methods for using sweet potato starch in the laundering of linen and other fine apparel. It is claimed that about 20% less sweet potato starch is used in laundering operations, as compared with ordinary starch. D. Scrivanich & Co.

A101. Dewey & Almy Chemical Co., Brochure; an analysis and statement of the financial structure of the well-known New England chemical house. Jackson & Curtis.

A102. Manganese, a handsome, 28-page manual illustrating and describing its value in soil, plant, and animal nutrition; a useful handbook of agricultural manganese salts and their applications. Harshaw Chem. Co.

A103. Schimmel & Co., Inc., Price Changes, leaflet listing new prices for some cosmetic perfume materials.

A104. Wood Preserving News, for August, devotes space to the use of creosoted timber in bridge-and road-building on some difficult jobs. Featured is an article on the use of treated timber in European power and communications lines. American Wood-Preservers' Association.

Equipment—Containers

E151 "Adsco" Piston-Ring Expansion Joint, described and illustrated in leaflet No. 35-15A, can be unpacked and repacked under full operating pressure without shutting off, or interrupting service. American District Steam Co.

E152. Aluminum News-Letter, July issue; contains oddities in the application of aluminum to fabricating and packaging problems. Aluminum Co. of America.

E153. The Cameron Motorpump, Form No. 1917, is an illustrated broadside showing the details of the compact and versatile power unit that is installed completely in a few hours; available with explosion-proof motor for handling flammable liquids, in sizes to 40 hp., or from 5 to 1000 gals. per minute. Ingersoll-Rand Co.

E154. Chemical & Industrial Equipment, an unusually attractive and readable catalog of processing and reaction vessels. Featured is a double-arm, single gland, vacuum mixer. "Readco."

E155. Colalloy Bulletins, Nos. 101738 and 101638, describe some of the uses of "Colalloy" in the chemical and textile fields. Colonial Alloys Co.

E156. Condenser News, Vol. 2, No. 1, presents latest twists in laboratory apparatus and the techniques to go with them. Scientific Glass Apparatus Co.

E157. Continuous Feed Kymograph, an extremely compact model, is described in a leaflet prepared by Phipps & Bird, Inc.

Chemical Industries
522 5th Avenue
New York City

I would like to receive the following booklets; specify by number: ....

....

Name ....

Title ....

Company ....

Address ....

All information requested above *must* be given to receive attention.

New Trade Marks of the Month

Conservado
368,520

QUEEN ANT CONTROL
368,523

EHART'S
369,355

PING PONG
389,748

WASATCH
400,713

DURFERRIT-HÄRTEMITTEL
403,391

A-M-R

404,738

HI-DEX
404,394

ATROLENE
405,840

Meta
411,000

DOWCLENE
411,826

DOWCLENE
411,827

THERMO-SOUNDSORB
413,043

ESSO
413,366

STATE BRAND
413,599

CURBAY
413,608

HERCULES
SYNTHESIZE
414,404

RED ROSE
414,672

FACTOGRAPH
415,288

KLIHEN
415,379

GENERAL ELECTRIC
415,451

GE
415,453

MECHLING'S
415,506

"PERMA-VENEER"
416,013

TRISOPHÖN"
416,345

MOM
416,651

MILCRITE
416,722

KOLENE
416,752

WAXEMUL
416,887

ATLANTIC
WAXEMUL
416,888

417,422

Trade Mark Descriptions†

Correction: On p. 176 of August issue, Trade Mark No. 418,017 ("Calsi-Ureor") was erroneously assigned to Monsanto Chemical Co., St. Louis, Mo. "Calsi-Ureor" is the trade mark of Synthetic Nitrogen Prods. Corp., N. Y. City, for fertilizers. Trade Mark No. 418,051 ("Santomask"), erroneously assigned to the above firm, is the property of Monsanto Chemical Co., St. Louis, Mo., and a trade mark for aromatic substances to be added to industrial products to improve the odor thereof.

368,520. Kaspar Winkler & Co., Alstetten, near Zurich, Switzerland; Nov. 30, '37; for paints, varnishes, inorganic and organic compounds or solutions of salts for use as paints and for hardening, coloring, and waterproofing stone, cement, and the like; use since July 3, 1911. Not subject to opposition.

368,523. Queen Ant Control, Inc., Columbus, O.; Mar. 21, '38; for insecticides; use since 1934. Not subject to opposition.

369,355. Not subject to opposition. Matthew B. Ehart, Philadelphia, Pa.; Apr. 27, '38; for insecticides; use since Mar. 2, '35.

389,748. The Pure Oil Co., Chicago, Ill.; Mar. 6, '37; for gasoline and motor fuel oil; use since July 30, '36.

400,713. Wasatch Oil Refining Co., Woods Cross and Salt Lake City, Utah; Dec. 10, '37; for gasoline, lubricating oil, and grease; use since Aug. 1, '33.

403,391. Deutsche Gold - und - Silber - Scheide-Anstalt (formerly Roessler), Frankfort-am-Main, Germany; Aug. 9, '38; for quenching products—namely, quenching oils, soap solutions, and aqueous salt solutions for use in metallurgical processes; use since 1929.

404,738. A-M-R Chemical Co., Inc., Brooklyn, N. Y.; for glass cleaner and polish, polishing powder for polishing glass surfaces, and cleaning compounds for clothes; use since Mar. 1, 1930.

404,394. American Maize-Products Co., N. Y. City; Mar. 23, '38; for corn syrup used in the manufacture of confectionery use since Feb. 26, '38.

405,840. Atrolene Oil Co., Lowell, Mass.; Apr. 29, '38; for lubricating oil and greases, and gasoline; use since Sept., '33.

411,000. Lonza Elektrizitatswerke und Chemische Fabriken Aktiengesellschaft, Gampel and Basel, Switzerland; Sept. 26, '38; for insecticides, disinfectants, and vermin and weed destroyers; use since July '37.

411,826. Dow Chemical Co., Midland, Mich.; Oct. 20, '38; for dry cleaning solvents; use since Aug. 15, '38.

411,827. Dow Chemical Co., Midland, Mich.; Oct. 20, '38; for dry cleaning solvents; use since Sept. 22, '38.

413,043. Gypsum Insulation & Mfg. Co., Los Angeles, Calif.; Nov. 22, '38; for insulating plaster materials; use since Oct. 27, '38.

413,366. Standard Oil Co. of N. J., Wilmington; Del.; Dec. 1, '38; for liquid gloss and floor dressing, ready mixed paste and metallic paints, paint enamels, and primers; use since Dec. 21, 1928 (liquid gloss and floor dressing), since Oct. 28, '38 (other goods).

413,599. The State Chemical Mfg. Co., Cleveland, O.; Dec. 8, '38; for furniture polish, floor polish, and automobile polish; use since June 1, 1931.

413,608. U. S. Industrial Alcohol Co., N. Y. City, assignor to U. S. Industrial Chemicals (N. Y. City), a corp. of Delaware; Dec. 8, '38; for core binders, washes and adhesives of various kinds—namely, those produced from concentrated distillery wastes; use since Feb. 6, 1924.

414,404. Hercules Powder Co., Wilmington, Del.; Dec. 31, '38; for synthteic textile finishing agent; use since Nov. 21, 38.

414,672. John H. Tuell (Guarantee Oil Co.), Connersville, Ind.; Jan. 10, '39; for gasoline, kerosene, and lubricating oils; use since Mar. 1, 1929.

415,288. Folmer Graflex Corp., Rochester, N. Y.; Jan. 27, '39; for sensitized films, photographic papers, plates, etc., for photographic purposes; use since Oct. 23, '26.

415,379. Sol A. Cohen (Klihen Co.), N. Y. City; Jan. 30, '39; for liquid insecticide; use since Jan. 1, '39.

415,451. General Electric Co., Schenectady, N. Y.; Jan. 31, '39; for washing compounds and cleaning and polishing compounds for painted or enameled surfaces or the like; use since 1932.

415,453. General Electric Co., Schenectady, N. Y.; Jan. 31, '39; for washing compounds and for cleaning and polishing compounds for painted or enameled surfaces or the like; use since 1932 on cleaning and polishing compounds, and since May, '38, on washing compounds.

415,506. General Chemical Co., N. Y. City; Feb. 2, '39; for caustic alkali preparations suitable for cleaning drain pipes, removing paint and varnish, and other household and industrial uses; use since 1892.

416,013. Joseph C. McNally, Portland, Ore.; Feb. 14, '39; for cleaners and detergents having incidental water-softening properties, used for cleaning fabrics, painted surfaces, kitchen utensils, and the like; use since June 10, '38.

416,345. Standard Industrial Products, Inc., Evansville, Ind.; Feb. 23, '39; for varnish, lacquer, brushing lacquer thinners, and the like; use since November, '38.

416,651. Laboratori Chemici Candioli Soc. An., Livorno, Italy; Mar. 3, '39; for insecticides in solid, liquid, paste, and /or powder form; use since May, 1923.

416,722. Cow & Gate (Canada) Ltd., Gananoque, Ontario, Canada; Mar. 6, '39; for bakery product comprising skimmed milk powder to which has been added a small quantity of a food ingredient containing proteins, carbohydrates, edible mineral salts, and an organic acid such as lactic acid; use since July 20, '38.

416,752. Webster-Walsh Co., Detroit, Mich., to Kolene Corp., Detroit, Mich.; Mar. 6, '39; for solvent for use as a dry cleaning preparation for fabrics and for degreasing metals, and as a detergent for general purposes; use since Jan. 5, '39.

416,887. Atlantic Refining Co., Philadelphia, Pa.; Mar. 10, '39; for paraffin wax; use since Jan. 9, '39.

416,888. Atlantic Refining Co., Philadelphia, Pa.; Mar. 10, '39; for paraffin wax; use since Jan. 9, '39.

417,422. Oil Workers International Union, Fort Worth, Tex.; Mar. 22, '39; for gasoline, motor oils, lubricating greases, kerosene, fuel oil, waxes, paraffin; use since July, 1922.

† Trademarks reproduced and described cover those appearing in the *U. S. Patent Gazettes*, May 30 (Class 2 et sequ.) to June 27, inclusive; also, July 4, Class 1. See also next page.

New Trade Marks of the Month

CYKON
417,601

CYKORA
417,602

CEMCO
417,868

KEROID
417,896

SYNTHE-WOOD
418,043

ALFRAMINE
418,112

E-D-E
418,195

418,356

D and A
418,355

PLIOWAX
418,574

FLEX
418,634

J. H. MORLEY & CO. CLEVELAND
418,735

TENOL
418,751

D. R. L.
418,794

SILVER DUST
418,485

THOUSAND AND FIVE PRODUCTS EXCEL 1005 WM & V
418,845

STEELBOND
418,981

METLAK
418,210

KROMALIN
418,452

LIBERTY BRAND FERRO-CERIUM SPARK METAL TRADE MARK MADE IN USA GUARANTEED AGAINST POWDERING
418,529

MELOCOL
418,604

MELOPAS
418,605

Minstrel
418,699

DP INC
418,824

ZYFO
418,876

TRANZ
419,038

X-DUR
419,039

X-SYN
419,040

METAG
419,219

THERMOPLEX
419,273

AZOSOL
419,553

MEO-181
419,570

(Trade Mark Descriptions Continued)

417,601-2. Agfa Ansco Corp., Binghamton, N. Y., a corp. of Del.; Mar. 29, '39; for sensitized photographic paper; use since Mar. 3, '39.

417,868. Clearview Equipment and Manufacturing Co., St. Louis, Mo.; Apr. 5, '39; for setting compound used in the erection and construction of monuments and mausoleums; use since May 5, '38.

417,896. United Carbon Co., Inc., Charleston, W. Va.; Apr. 5, '39; for ready-mixed paints; use since Mar. 14, '39.

418,043. Howe & French, Inc., Boston, Mass.; Apr. 10, '39; for cementitious material consisting of wood in paste form which hardens when exposed to air; use since May 29, 1931.

418,112. Michel Export Co., Inc., N. Y. City; Apr. 11, '39; for textile softeners and finishing agents; use since Oct. 1, '37.

418,195. General Chemical Co., N. Y. City; Apr. 13, '39; for insecticides; use since Sept. 14, '38.

418,356. New Process Metals Corp., Newark, N. J.; Apr. 17, '39; for pyrophoric or sparking metal alloys; use since Mar. 4, '39.

418,355. National Broom Mfg. Co., Pueblo, Colo.; Apr. 17, '39; for dry cleaning preparation, a glass cleaner and a cleaner for paint and varnished woodwork, composition floors, linoleum, and tile; use since Jan. 1, '39.

418,574. Goodyear Tire & Rubber Co., Akron, O.; Apr. 22, '39; for resinous material for use in lacquers, paints, and other coating compositions; use since Sept. 24, '37.

418,634. The Glidden Co., (Durkee Famous Foods), Cleveland, O.; Apr. 24, '39; for vegetable shortening; use since Apr. 21, '39.

418,735. National Lead Co., N. Y. City; Apr. 26, '39; for white lead, dry and in oil, and oxides of lead; use since 1867. Under 10-year proviso.

418,751. Sinclair Oil Refining Co., N. Y. City; Apr. 26, '39; for lubricating oil; use since Aug. 15, '36.

418,794. Lucia M. Szarlip, Toledo, O.; Apr. 27, '39; for cementitious composition especially for repair of dentures; use since Jan. 2, '39.

418,485. Lever Bros. Co., Cambridge, Mass.; Apr. 20, '39; for soap; use since May 29, '31.

418,845. Mittag & Volger, Inc., Park Ridge, N. J.; Apr. 28, '39; for carbon paper, inked ribbons, and inks such as numbering machine ink, stencil duplicating ink, hectograph pen and printing ink; use since Nov. 17, '37, on inked ribbon, and since Jan. 3, '38 on other goods.

418,981. Parker Rust Proof Co., Detroit, Mich.; May 2, '39; for steel sheets which have been chemically treated to obtain upon the surfaces thereof corrosion-resistant paint-holding coatings; use since Apr. 29, '39.

418,210. Pope & Gray, Inc., N. Y. City; Apr. 13, '39; for printing and lithographing inks, and finely divided metals as ingredients therefor; use since Mar. 30, '39.

418,452. Sherwin-Williams Co., Cleveland, O.; Apr. 19, '39; for ready-mixed paints, paint enamels, lacquers, varnishes, white lead, dry colors and paint pigments; use since Jan. 18, '38.

418,529. New Process Metals Corp., Newark, N. J.; Apr. 21, '39; for pyrophoric or sparking metal alloys; use since Apr. 5, '39.

418,604-5. Society of Chemical Industry in Basle, Basel, Switzerland; Apr. 22, '39; for synthetic resins sold in solid, liquid, or powdered form for industrial purposes, and molding or casting compositions; use since Nov. 5, '37.

418,699. American Varnish Co., Chicago, Ill.; Apr. 26, '39; for liquid paint enamels; use since Apr. 13, '39.

418,824. Distillation Products, Inc., Rochester, N. Y.; Apr. 28, '39; for grease, particularly adapted for use in sealing removable parts of vacuum apparatus; use since Mar. 20, '39.

418,876. Industrial Soap Co., St. Louis, Mo.; Apr. 29, '39; for powdered toilet soap, metal polish, sweeping compound, and oil soap; use since Dec. 31, '38.

419,038. The Patterson-Sargent Co., Cleveland, O.; May 3, '39; for dry and ready-mixed paints, paint enamels, stains, lacquers, and varnishes; use since Apr. 5, '39.

419,039-40. The Patterson-Sargent Co., Cleveland, O.; May 3, '39; for dry and ready-mixed paints, paint enamels, stains, lacquers, and varnishes; use since Apr. 5, '39.

419,219. California Spray-Chemical Corp., Wilmington, Del., and Richmond, Calif.; May 9, '39; for parasiticides; use since Apr. 21, '39.

419,273. Resinous Products & Chemical Co., Philadelphia, Pa.; May 10, '39; for synthetic resinous compounds; use since Apr. 24, '39.

419,553. General Dyestuffs Corp., N. Y. City; May 18, '39; for dyes and dyestuffs; use since May 5, '39.

419,570. Armour & Co., Chicago, Ill.; May 19, '39; for chemical wood eradicant; use since June 29, '38.

Changes Name

National Adhesives Corp., N. Y. City, is now known as National Starch Products, Inc. Change of corporate name was effective late last month. National Adhesives Corp. will continue to operate under the old name as a division of the new corporation, manufacturing its well-known line of adhesives, lacquers, and allied products.

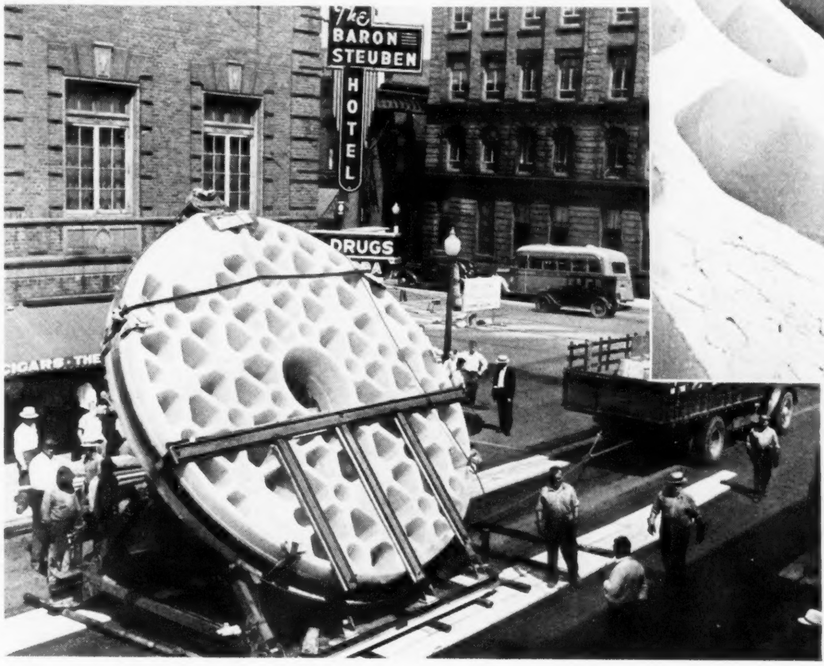
Appointed Distributor

Carl F. Miller & Co., Inc., 1033 6th Ave. South, Seattle, Wash., has been appointed distributor for the state of Washington, for Hanson-Van Winkle-Munning Co., Matawan, N. J., manufacturer of electroplating equipment and supplies.

Jack M. Noy is now a research chemist in the laboratory of Foote Mineral Co., Philadelphia.

Glass and the Stars

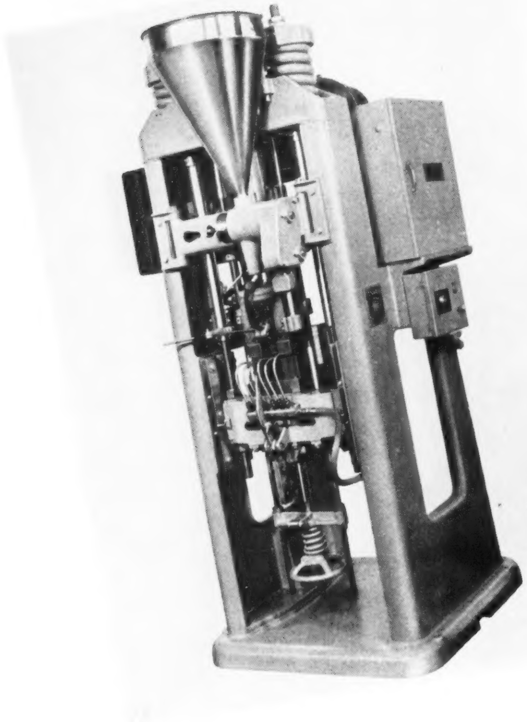
A veritable glass giant, the world's first 200-inch telescope disc, is moved through the streets of Corning to the Public Square where it will go on exhibition. Mounted in a steel cradle, it is hauled forward a few feet at a time. Planks are laid down to protect the road bed and to provide a more even surface.

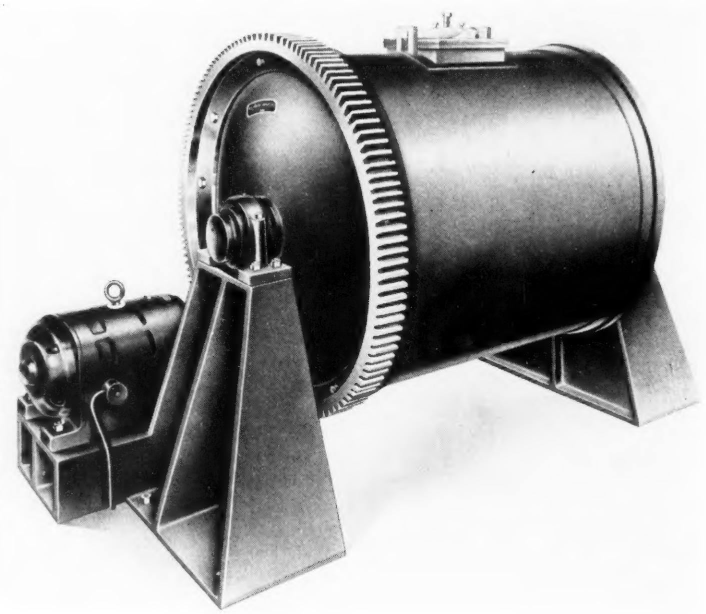


They ride on ribs of steel above a giant eye. Workmen start down from their perch on the curved steel T-Ribs which will support the dome of the new 200-inch Telescope Disc Museum now being erected in the City Square at Corning, N. Y. The museum, believed to be unique in the world and developed in the architectural style of an astronomical observatory was designed by J. Alden Van Campen. The disc which is the world's largest piece of glass was poured at the Corning Glass Works, March 25, '34.

Progress on buildings for the giant plant of the Celanese Corporation of America between Narrows and Pearisburgh, Va., is indicated in these pictures. Left, is the textile building, almost enclosed, except windows; below is the spinning house. These are the largest buildings being erected.—Courtesy, *Roanoke Times.*

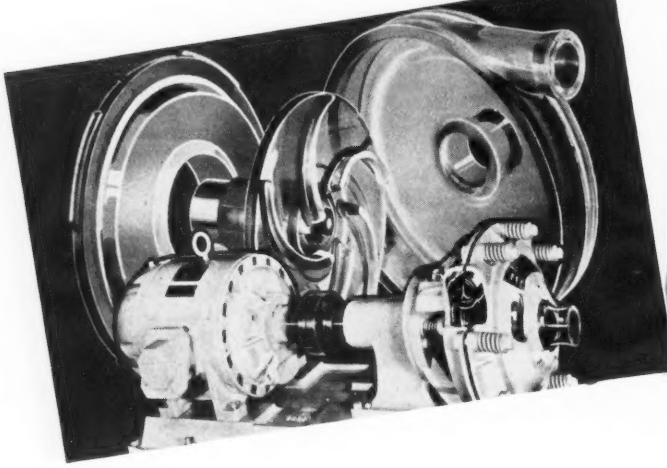
New in the Chemical Equipment Field

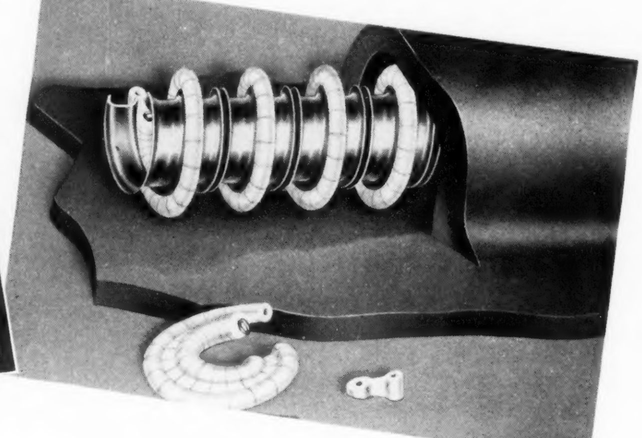




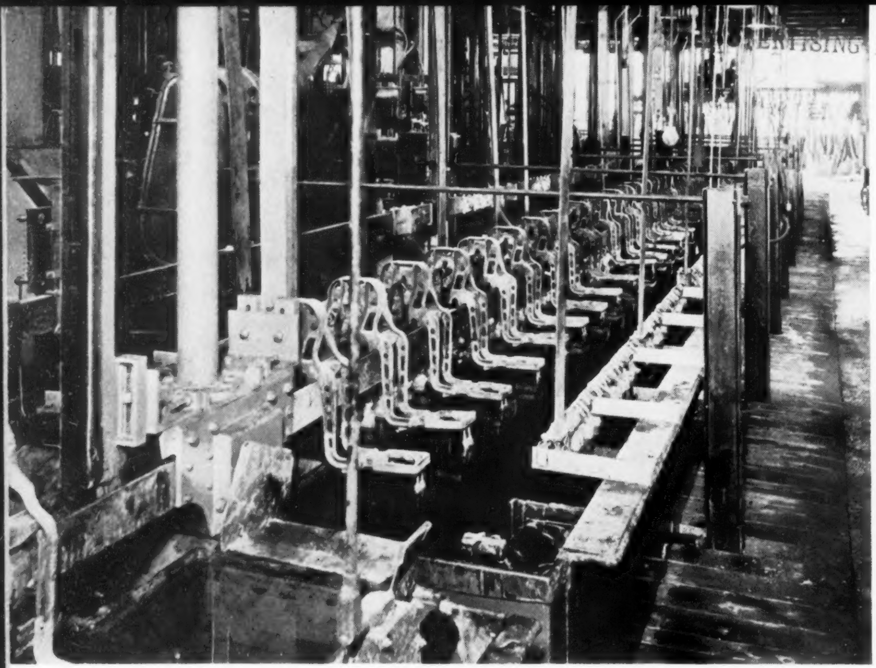
Right, The H. K. Porter Company, Inc., known for more than 70 years as manufacturers of industrial and switching locomotives, recently has expanded its activities by the establishment of a separate division for the design and manufacture of many types of processing equipment. Several of these products incorporate new features of design and construction developed by the company's process equipment engineering department. Several brand new features are claimed for the Porter ball and pebble mill shown. Left, another addition to the line of Stokes Completely Automatic Molding Machines has just been announced. This is a larger, 15-ton capacity, 10-inch stroke machine for molding thermosetting plastics. F. J. Stokes Machine Co., Philadelphia, is the maker.

In this ingenious model of face shield are three types in one. It has been made practical with a complete interchangeability of parts and the screen, fibre or "plastacele" guard may be quickly buttoned on at the option of the wearer. When fitted with Plastacele window, it is ideal for spot, flash and gun welding, scale etc. . . when fitted with wire screen window, it is recommended for use for babbitting, heat protection, buffing, polishing, wire brushing, die casting, flying etc. . . Fibre front and Glass holder give the wearer complete protection for acetylene welding, burning, scarfing, etc. The Boyer-Campbell Co., Detroit, is the maker.





Nash Engineering, South Norwalk, Conn., introduces the Nash Pump of Glass—a centrifugal of "Pyrex" Brand heat, shock, and acid resistant glass. Right, Patterson Foundry & Machine Co., East Liverpool, Ohio, announces new electric heating element known as the Patterson "Flasheat" element. Claims for this element are: more rapid heat-up; more heat concentration per unit area when desired; rapid water cooling; higher efficiency; unusual ruggedness; immunity from mechanical destruction; longer life than other elements; immediate replacement without removal of insulating jacket from kettle or other receptacle on which these elements are used; no necessity for pre-forming to fit shape of kettle or other body to be heated.



The Standard Steel Spring Co., Coraopolis, Pa., has recently completed the largest nickel plating tank in the world. Operating volume of the new tank is 27,500 gals. Tank is fabricated of 3/8 inch steel plate lined with 1/4 inch of rubber. Inside dimensions of the tank are: length 67 feet 7 inches; width 6 feet 10 inches; depth 8 feet 3 inches. Weight of the nickel anodes is 33,000 lbs. Total value of solution and anodes is about $26,000.00.

The rapid expansion of Reichhold Chemicals, Inc., Detroit, (formerly Beck, Koller) into the industrial chemical field is vividly portrayed in the display of products in the lobby of the main office.

Top, J. C. Leppart, assistant director of sales, Columbia Alkali, who with W. I. Galliher, vice-president and director of sales, comes to N. Y. in a shift of the company's main sales offices from Barberton. Directly above, Jean-Henry Godhaird, Société Générale des Minerais, Brussels, who sailed recently after a six-weeks visit.

Officers of the recent Western Chemical Congress held Aug. 8-12 in San Francisco. For report of the meeting see page 313. Left to right, J. W. Beckman (member); Dozier Finley (chairman); F. T. Leichfield, consulting engineer, Wells Fargo Bank & Union Trust Co.; A. A. M. Russell, representing the San Francisco Harbor Commission; Rene Engel, secretary of the Congress. Photo, courtesy, Pacific Chemical & Metallurgical Industries.

S. L. Redman, Redman Scientific Co., who presided at the first session. Photo, courtesy Pacific Chemical & Metallurgical Industries.

Western Chemists Evaluate Their Resources

THE First Western Chemical Congress, held in San Francisco, August 8-12, has focused attention on the raw materials available along the Pacific Coast and the possibilities of expansion in the chemical and allied manufacturing fields. "Chemical Industries" asked the well-known chemical engineer, H. O. Chute, to report the highlights and his personal impressions of this epoch-making convention.

THE Western Chemical Congress was organized last year through the efforts of Rene Engel, M.E., to bring together the chemist and engineer who have common interests in the special chemical problems of the Pacific Coast.

The climate of the Pacific Coast from Alaska to Patagonia differs from that of the Atlantic, and from Europe, from which most of our early ancestors came. Our forefathers had in Europe, and found in the colonies, a climate where rain (or snow) fell throughout the year in fairly uniform manner, and crops grew without irrigation. There were no deserts. The Pacific Coast climate is governed almost entirely by its relation to the ocean and the winds from the water which are tempered by the ocean, and deposit, as rain; the absorbed moisture largely during the winter months being most copious in the north and with the rain decreasing as one moves further south. Lower California is almost all desert. This regulates the forest growth, and, consequently, the manufacture of paper which consumes a large tonnage of chemicals and produces chemical by-products such as tannin extracts, alpha-cellulose sulfite waste concentrate.

The dry summer allows the production of salt by solar evaporation during the four to six months of dry and rainless summer from San Francisco Bay to San Diego Bay. This desert chemical is consumed in immense quantities by the fisheries and for domestic and other purposes. The true deserts east of the mountains with their dried-up lakes and chemical deposits are developed to the point of large production of trona or sesqui-carbonate of soda and borax, the latter both from the brine of the lakes and the solid product from deposits of geological dry deserts which have not been washed out by later rains.

This summer desert climate also seems to encourage insect life much more than does the eastern climate and the insecticide industry is quite extensively expanded, though at present insecticides are usually brought from the east and distributed by local dealers.

Recently the papers noted the shipment to England of a small cargo of California potash. The California deposits furnish the entire world with borax. The large increase of electric power developed by Boulder Dam and by the Columbia River projects will provide very cheap current along the Pacific Coast. The East has no large river falling from high mountains near the coast to produce cheap electric power. For these and other reasons (including local pride) it was decided to hold the first Congress in San Francisco.

The results were encouraging and satisfactory as will be seen from perusal of the proceedings:

The Congress opened on Tuesday, August 8th, at 1:30 P. M. and meetings were held each afternoon and at eight o'clock every evening.

The meeting opened with a welcoming address by F. T. Setchfeld, C. E., of the Wells Fargo Bank, who spoke hopefully for the future of the chemical engineers as developers of the future west, as the mining engineers had previously developed the mineral output. J. P. Marias, president of the State Harbor Commission was not present, but A. W. Russel, engineer of tests, "pinch hitting" for him, gave a more technical address than perhaps the president would. He emphasized the necessity of chemical research, both for fire protection, particularly from oil sludges and floating films which set the bay on fire and also mentioned the sewage problem, which, like that of New York, is tremendous and not yet satisfactorily solved. At 3:00 P. M. the real technical meetings began led by S. S. Redman of the Redman Scientific Co.

The first paper: "Industrial Applications of Graphical Methods in Polynary Systems," by Merle Randall and Bruce Lougtin, both of the University of California.

The second paper: "Application of Some Fundamental Principles of Stoichiometry and Thermodynamics to Simplification and Clarification of Industrial Chemical Problems," by Pierre Van Rysselberghe of Stanford University.

These papers were on "graphite" and "paper" chemistry with formulas described for prediction of results which sometimes happen as expected. The third paper—by K. A. Kobe, described the dehydration of deca-hydrated sulfate of soda (Epsom salt) to mono-hydrate by electrical heat. The discussion developed that this process is as used (and described) in producing anhydrous sulfate at Trona for glass manufacturing.

The Tuesday afternoon session at 3:00 of the Food Chemistry Division & Technology, was, of course, on man's primary need—food. The under chairman was C. S. Ash of California Packing Corporation. The first two papers

showed that the problems here on food preservation were the same as in the East. The third paper on olives was of interest only to California chemists as the production of ripe olives is a California monopoly and olives are not grown or preserved in any other state.

Tuesday evening session at 8:00 began with a paper by M. Randall of the University of California, Berkeley, on "Distillation Methods: Transient vs. Continuous." This proved to be a description of a distillation process for "heavy water." The principle is that the distillate from the column still is condensed and stored in a tank instead of being passed through a dephlegmator refluxing into the column, and so cooling it and promoting fractional separation. In the discussion following, the large new distillation apparatus installed by Urey of Columbia University, Havemyer Hall, was referred to and the fact that all fractional distillation depended on the same chemical and physical principles, regardless of the substances treated whether in manufacturing of liquid oxygen and air or whether in vacuum distillation of heavy lubricating oils that cannot be distilled without decomposition except in vacuo, was stressed.

Western Phosphates Discussed

Professor K. A. Kobe and others in treating "Reaction of Calcined Phosphate Rock With Alkali Carbonates," described an experiment of treating calcium phosphates with alkali carbonates. It was found that the native phosphates which all contain combined fluorine were absolutely resistant to sodium and ammonium carbonates, with silica (SiO_2). The phosphates that were calcined (and so freed from F) were slightly soluble in the carbonates, if very finely ground and shaken a long time—in a shaker they had devised. Ammonium carbonate dissolved much more phosphate than sodium carbonate, but neither dissolved enough to permit of any commercial use.

It was brought out in discussions that this work was done in hopes of utilizing the billions of known tons of rock phosphate in Montana and Idaho and other northwest states, none of which is near the coast or water transportation. Attention was called to the work done more than five years ago and/or reported by the Agricultural Department. It was found that all natural phosphates were combined with fluorine which made them resistant to all chemical solutions of alkalies, but when roasted with enough sand the fluorine passed off as hydrofluoric silicic acid and they became citrate solutions. It was suggested that the western phosphates—which were proved to be extensive enough to last for 7000 years when the President first became publicly "conscious" about conservation—might be reduced to free phosphates by the "Siljinroth" process, as used extensively in Germany, and the free phosphates sent to California in tank cars which might return with gasolene.

The last paper on Tuesday night was by T. K. Cleveland on silicates. The manufacturer on the Pacific Coast is a branch of Philadelphia Quartz whose products have been completely described in various publications. Methods of manufacturing were not touched on here or elsewhere.

The Wednesday afternoon meeting was a symposium on "Western Resources." Chairman W. Bradley, State mineralogist, Division of Mines, San Francisco, and later Ray H. Nagel, technical assistant, Western Regional Research Laboratories, U. S. Department of Agriculture, Berkeley, described the objectives of the western regional research laboratories. It appeared that the old Chemistry Division of the Agricultural Department, so long famous under Dr. Wiley, has been expanded into regional laboratories. They do not seem to know fully just what are their duties, but seem certain that they are to enforce the food and drug act in their respective regions. This will seemingly produce 9 different interpretations of the Act when the 9 Circuit Appeals Courts give decisions, which will multiply the present uncertainty and confusion.

Ivan Bloch presented a paper which was a good sales talk for the Bonneville Dam project. The outlet for the power produced is not at present apparent and many visionary schemes are recommended. Portland is only forty miles distant and might use some very cheap power.

The Wednesday evening session was entirely devoted to welding, which is a rapidly growing industry, but which has little interest or possibilities for the chemist.

West Coast Oil Industry

The session of the Vegetable Oil Division on Wednesday evening was especially interesting and enlightening. The larger portion of the oil industries of the Pacific Coast work on imported oils, though fish oils from the great fishing industry are produced in large quantity and some, such as sharks' liver oils, are made into vitamin foods or drugs much superior to cod-liver oil. Hydrogenated sardine oil is produced on the Pacific Coast.

The uses of vegetable oils on the West Coast for soap were described by M. R. Dickson of Colgate-Palmolive-Peet. The soap industry on the Coast has developed greatly since the war when soap was made from caustic soda produced in New York State or Hutchinson, Kansas. None of the large eastern companies made soap here then. Now, most of them have plants, mostly in California, and use oils produced on the coast and alkalies made in the lakes and electrolytic plants. All raw materials used (except perfumes perhaps) are local West Coast products. Even the wrappers are made from paper produced on the Coast.

The paper, "Historical Review of the Cocoanut Oil Industry on the Pacific Coast," by J. D. Enas, chief chemist, El Dorado Oil Works, Oakland, and a man who has lived through it all, disclosed that the first cocoanut oil from copra was made on the West Coast and the war vastly stimulated the industry, but that it is now depressed by government policies of restriction of imports and processing taxes and other obstacles.

The paper, "Development of Flaxseed and Linseed Oil Industries on the Pacific Coast," by H. V. Gilmore, assistant superintendent at the El Dorado plant pointed out the rapid development of flax production and manufacturing of linseed oil and by-products that has taken place in the last few years on the West Coast.

Pacific Coast Brewing Practices

The Thursday afternoon meeting began with a paper by B. Lowy on the hydrogen-ion control in brewing. The conclusion was that a pH of about 8 was best. In other words, pure water makes the best beer. In answering a question, this expert described how "steamer beer" which is a West Coast product, is made. It appears that this should be described as a "warm" beer, as it is produced by a thermophyllic yeast or perhaps bacteria that will ferment in a very warm wort and the fermentation is completed in one day. No pasteurization is used, but the beer is quickly bottled (or kegged) and should be consumed within a few days of its manufacture. There is no "lagering" and it is not the German beer but is praised highly here: *Degustilius non disputandem.*

The two following papers, one on "Disposal of Food Wastes," by C. G. Gillespie, chief, California State Bureau of Sanitary Engineering, Berkeley, and the other, "Prevention of Stream Pollution by Existing and Potential Industries," by W. C. McIndoe, industrial chemist of Portland, Oregon, described attempts of sanitary engineers to dispose

of trade wastes by methods used for treating sewage by sanitary engineers and not very good results were reported, owing to many trade wastes containing more than ten times the amount of soluble solids found in sewage, together with much solid matter. The methods first used by Arno Behr in corn starch plants comprising multiple effect evaporation and drying the insoluble solids and producing "gluten feeds" for cattle were cited.

It was also explained that before the end of the previous century that sulfite waste lignin was concentrated and used for core compounds and for road treatment and later for a tanning extract by which the greater part of our sole leather is now made. Late developments of lignin separation and production of lignin plastics and also manufacturing of vanillin were mentioned, showing that chemical engineers rather than sanitary engineers had been most successful in treating trade wastes, and that laws against pollution had been the main reason for production of products from trade wastes. The paper by McIndoe dealt also with stream pollution, particularly treating of paper mill wastes.

H. R. Harlan, a paint chemist of San Francisco, in a paper entitled "Paint Complaints," exhibited a number of lantern slides showing paint failures on the new San Francisco-Oakland bridge paint. Though the blame was shifted from the paint makers to the painters, no very definite means was disclosed for correcting the paint failures, except care. The entire Thursday evening session was devoted entirely to corrosion problems. Chairman Dozier Finley, director of technical research for the Paraffine Companies, Emeryville, California, described how asphalt prevented corrosion, and a paper by H. A. Knudsen, East Bay Municipal Utility District, Oakland, described how corrosion was prevented on pipe lines in the salt waters of the bay and other waters and sewage.

Enforcing California Agricultural Laws

On Friday, August 11, the morning was devoted to an address by Alvin J. Cox, chief, Division of Chemistry, California State Dept. of Agriculture, explaining how the state agricultural laws were enforced by the Division of Chemistry. Attention was called in discussions to the previous paper by Nagel and the relation of this seeming duplication of work by Federal and State was questioned, but the author thought they could get along together.

The paper on "Unusual Problems of an Industrial Laboratory," by Emory E. Smith, was a series of most interesting reminiscences of chemical work for many clients extending far back into last century. Many were not suitable (or at least advisable) for publication, but many of the older chemists recalled quite similar incidents in their professional careers.

The paper by J. A. Hall on "Possibilities in Chemical Wood Utilization and their Relation to Forest Management," was full of hope for the dendro-chemist but the author did not seem to be familiar with the successes and failures of attempts made earlier in the East with the chemical utilization of forest products and by-products. The paper by W. C. McIndoe on "Rayon Industry for the Pacific Coast" should have been included in the evening session devoted to plastics.

There are no synthetic plastics yet made on the West Coast. There is no doubt that alpha cellulose for plastics could well be made here and the molding of plastics is an important industry. Cellulose plastics, including celluloid, gun-cottons-cellulose-acetate, and nitrates can be made entirely from raw materials now manufactured on the Coast.

The Bakelite plastics cannot well be made here for there are no valuable coal deposits in the three Pacific States. No coke is made here but is shipped from England and Birmingham, Ala.

Viscose could be made from Coast products. The alpha-cellulose could be made from northern forest products. The caustic needed is made here by three companies. Carbon disulfide is also available. Perhaps the later synthetic plastics could be made from synthetic condensation products of the oil industry. Soy bean plastics might be made from extracted residue from imported soy beans.

The motion picture "The Fourth Kingdom" was instructive. Production of synthetic fibres seems undesirable now as it requires large amounts of cheap female labor. The labor situation here is worse even than in the other parts of the country.

Entertainment Side of the Congress

Saturday morning was devoted to a ride around the Harbor as guests of the State Board of Harbor Commissioners. The Congress delegation met at the Fairmount and the Commissioner furnished autos and took them first to the Sansilito Ferry where their jurisdiction first begins. In passing the fish wharf we were reminded that many chemical products resulted from the by-products. At the first dock a Japanese steamer was unloading a cargo of silk that is rushed east by special fast trains. A tariff of 50c per lb. on skeined silk with cocoons free would ruin the Japanese industry and help our plastic or synthetic fibre industry and perhaps establish silk production here, both raising of worms and reeling the silk from cocoons.

On Saturday afternoon the Congress met in front of the Ford Building at the Golden Gate Exposition and guides explained the sillimanite exhibit of spark plugs, the very elaborate model of the wood distilling plant of the Ford Company in Michigan, which takes offal from the lumber plant and converts it into charcoal briquettes and methyl acetate used by Ford as solvent and other usual products which, being used at the auto plant do not show so much loss as if put on the market. The model plant equipment is of shining stainless steel and burnished copper and is proclaimed the only plant of its kind in the world.

A large model of the Rouge River plant shows iron ores from the Imperial mine on the Marquette range and other ores being unloaded from lake vessels and conveyed to iron blast furnaces. The by-product coke ovens are also in the model. The models of the chemical and metallurgical plant are superior to those shown at the World's Fair at New York. Making tires is shown in connection with a Firestone exhibit along with the Ford exhibit.

Objectives of Conference Attained

The Western Chemical Congress served a very useful purpose of focusing attention on the "chemical side" of the Pacific Coast; not only its present status, but of much greater importance, the future possibilities. Rich in many essential resources, there will be a tremendous expansion in the chemical and allied industries in the area between the Rockies and the Pacific Ocean and strictly speaking, both the Rockies and the Ocean should be included, for they are and will continue to furnish much of the materials that will mean chemical expansion of first magnitude for the West Coast. Future conferences will undoubtedly continue to focus the attention of the country as a whole on the tremendous possibilities in the states of Oregon, Washington and California for the production of important industrial chemicals and consumer products in which chemicals play an important role.

News Review of the Month

American Chemical Industry, 1914—'39

THE die is cast. The battle of words in Europe is over and the war of blood is on. Europe is celebrating the Silver Anniversary of the World War by plunging headlong into another which promises to be even more horrible than the last.

Diplomacy has failed to halt the holocaust and already parts of the Continent are in shambles.

Of the many things for which we in this country should be profoundly thankful, one is our chemical industry, the largest in the world, self contained in every respect. Happily this situation is unlike that which we faced with so much fear in 1914.

American industry is assured this time of ample supplies of every vital chemical. We owe a profound debt of gratitude to the men whose courage, foresight and resourcefulness have made this possible, possible in the face of almost unsurmountable difficulties and discouragements.

For a period of a decade, during which we have passed through the worst depression in history, American chemical manufacturers have steadfastly refused to accept a defeatist attitude or to dispense with huge expenditures for research. As a result of this admirable policy, a constant stream of new products has flowed from American chemical laboratories. These are products of and for peace—not war. They add to the material comforts and pleasures of life, they make life more certain. Even from the most selfish and materialistic point of view, American chemical manufacturers want peace, not war.

Let us pray that reason will prevail; that war in Europe will be rapidly terminated; that the conference table at which justice shall dominate will quickly be substituted for the sword. But no matter what part destiny calls upon American chemical industry to fulfill, it is fully ready. This is, indeed, a comforting thought in the dark and uncertain days ahead.

Walter J. Murphy

Managing Editor.

COMMODITIES SOAR ON WAR NEWS

Wild Wave of Buying Develops—American Chemical Industry Deluged With Export Inquiries—Prices of Nearly All Metal Derivatives Advanced Sharply—Embargo Announced Sept. 5 on "War" Chemicals—

THAT which was unbelievable is now a stark reality—Europe again is in a death struggle. Stunned almost to the point of complete numbness Americans returned to business on Sept. 5, following the three-day Labor holiday, to find that history has a horrible habit of repeating itself. Much of the confusion, much of the hysterical wave of speculation of 1914 was duplicated the moment the commodity markets from Coast to Coast were opened.

That the hostilities abroad would have severe repercussions in the chemical and allied fields in this country was a foregone conclusion. Only in the details was there any divergence of opinion.

As might easily be expected, the natural raw materials were the first to feel the full effect of war in Europe. Export inquiries for chemicals began to pour in. Even where purchases could be negotiated shipping space seemed in many cases almost impossible to arrange. War risk insurance rates advanced alarmingly, and for shipments to many points was unobtainable.

Higher Prices Inevitable

How long the first phase of the war hysteria will last is very difficult to speculate on. Higher prices appear to be inevitable. Considerable expansion in our exports seems more than likely. Severe contraction in our imports of chemicals and natural raw materials is a logical conclusion under the circumstances.

Will history repeat itself to the extent that heavy speculation in chemicals will again duplicate the early years of the last World War? Will there be another mushroom growth of chemical brokers? These were some of the questions men in the industry were asking each other.

Germany has overshadowed the other nations of the world in the chemical export markets. Where will and how will her customers turn to other sources of supply? According to the figures recently published in "World Chemical Developments," by the Chemical Division of the Bureau of Foreign & Domestic Commerce, Germany's exports in 1938 of chemicals and allied products amounted to the stupendous figure of $263,300,000, over twice that of the United Kingdom, over a hundred million dollars greater than that of the U. S., and nearly three times as much as France. Of course a sizable part of Germany's total was with countries with which she still may be able to conduct business on a restricted basis, but, unable to cope with England and France in sea power, most of her markets are gone. Nor will England and France

be in any position to carry on their normal export trade. It is reasonable to believe that both England and France will find it necessary to supplement with imports their own chemical output. Canada,

Foreign Trade of Principal Countries in Chemicals and Allied Products*

Country	Imports 1934	Imports 1938†	Exports 1934	Exports 1938†
Belgium	$45,900,000	$48,400,000	$57,700,000	$62,200,000
Denmark	20,900,000	26,600,000	3,200,000	3,900,000
France	76,400,000	64,500,000	111,900,000	90,600,000
Germany	100,500,000	84,200,000	251,500,000	263,300,000
Italy	40,700,000	29,500,000	23,700,000	29,700,000
Netherlands	55,000,000	55,000,000	46,000,000	48,600,000
Poland and Danzig	9,900,000	14,200,000	5,200,000	6,100,000
Switzerland	26,400,000	24,500,000	40,400,000	40,700,000
United Kingdom	105,000,000	117,300,000	123,400,000	131,700,000
Japan	42,600,000	46,100,000	28,800,000	34,800,000
Canada	34,500,000	38,400,000	15,300,000	20,500,000
United States	96,500,000	146,000,000	132,600,000	158,500,000

* Including countries for which statistics are available.
† All figures are preliminary and subject to correction.
Data source: "World Chemical Developments in 1938"—Dept. of Commerce.

buying a considerable portion of her chemical requirements from England, probably will find it necessary to turn to the U. S. for larger tonnages of vital chemicals.

Domestic Requirements to Expand

Expansion in our domestic requirements of chemicals is a certainty. Fortunately, American chemical industry is in a much more favorable position in 1939 than it was in 1914. The popular conception that we had no chemical industry prior to the World War is, of course, false, but we then were woefully lacking the knowledge and facilities to produce many essential dyes, intermediates, pharmaceuticals, fine chemicals and medicinals. The intervening 25 years between the World War and the present European conflict has seen the rise of the American chemical industry to an undisputed position at the head of the list of nations of the world.

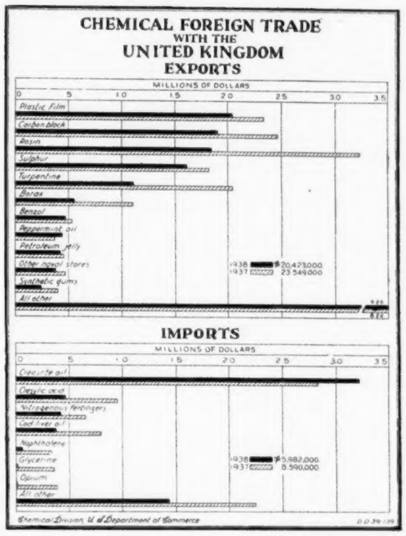
Neutrality Act Invoked

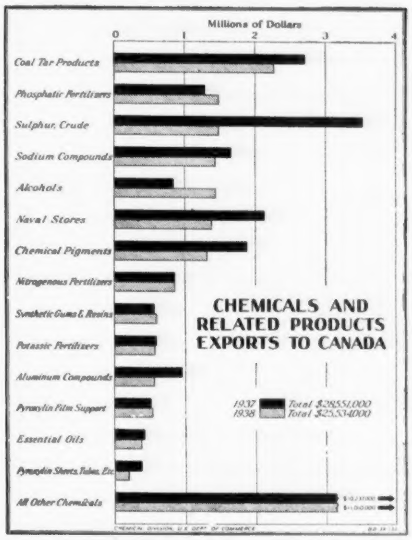
President Roosevelt on Sept. 5 formally proclaimed to the world the neutrality of the U. S. in the European War. In accordance with the Neutrality Act of 1937 an immediate embargo on shipments of a long list of materials was placed in effect against Germany, Poland, France, the United Kingdom, India, Australia and New Zealand. Canada and South Africa were not listed in the proclamation as among the countries at war. The President cited that the Parliaments of these British dominions had not acted on a war declaration as yet, hence they were not found by him officially to be in a state of war at this time. In some quarters it was held that Canada might withhold any declaration of war against Germany in order to play the role of "backdoor."

Products of a chemical nature contained in the President's Embargo proclamation were exclusively of two general classifications—explosives and poison gases and included the following:

Mustard gas (dichlorethyl sulfide); Lewisite (chlorvinyldichorarsine and dichlordivinychlorarsine); methyldichlorarsine; diphenylchlorarsine; diphenylcyanarsine; diphenylaminechlorarsine; phenyldichlorarsine; ethyldichlorarsine; phenyldibromarsine; ethyldibromarsine. Also phosgene; monochlormethylchlorformate; trichlormethylchlorformate (diphosgene); dichlordimethyl ether; dibromdimethyl ether; cyanogen chloride; ethylbromacetate; ethyliodoacetate; brombenzylcyanide; bromacetone; brommethylethyl ketone.

In addition to those listed the following





Sharp increases in our exports to Canada and the United Kingdom are expected in most quarters.

also: Propellent powders; high explosives as follows: nitrocellulose having a nitrogen content of more than 12%; trinitrotoluene; trinitroxylone; tetryl (trinitrophenol methyl nitramine or tetranitro methylaniline); picric acid; ammonium picrate; trinitroaninisol; trinitronaphthalane; teteranitronaphthalone; hexanitrodiphenylamine; and pentaorythritetetarnitrate (pentrite).

Still other materials listed in the embargo were: trimethlenetranitramine (hexagon or T4); potassium nitrate powders (black saltpeter powder); sodium nitrate powders (black soda powder); amatol (mixture of ammonium nitrate and trinitrotoluene); ammonal (mixture of ammonium nitrate, trinitrolluone and powdered aluminum, with or without other ingredients); and schneiderite (mixture of ammonium nitrate and dinitronaphthalone, with or without other ingredients).

Fate of the Neutrality Act

Whether the President will shortly call a special session of Congress to repeal the present Neutrality Act is unknown at the moment. Certain it is that considerable sentiment exists favoring its immediate repeal. It does not seem likely, however, that sales to belligerents will be on any other but a "cash-and-carry" basis.

First Half Exports, Imports Up

Except for sulfur, naval stores, and crude drugs, exports of chemicals and related products from the U. S. recorded substantial gains in the first half of the current year with increases ranging as high as 26%, according to the Chemical Division, Dept. of Commerce.

Total value of such exports during the half year period aggregated $82,825,000 against $77,500,000 in the corresponding months of 1938, an overall increase of 7%.

U. S. imports of chemicals and related products, including gums, resins, drying oils and drying seeds, advanced steadily during the first half of the current year and recorded a gain of 18% over receipts of such products in the corresponding months of 1938.

Receipts of these materials reached a total value of $90,000,000 in the current year period, against $76,473,000 in the corresponding months of 1938.

News Index

Specialties 318
Heavy Chemicals 319
Coal-Tar Chemicals 320
Solvents 321
Fine Chemicals 323
Raw Materials 324
Agricultural Chemicals 325
Fats & Oils 327
Pigments, Fillers, etc. 328

News of the Specialties

¶ All-America Package Competition Enlarged In Scope—Group Formulating Soap and Detergent Specifications To Meet—Packaging Institute to be Held in Chicago, Oct. 19—

The 9th Annual All-America Package Competition, sponsored by *Modern Packaging Magazine*, was announced last month in the columns of the Magazine's August issue. No entry fee is required, nor is there any restriction as to the number of entries by any one concern. Twenty broad classifications, including 2 major changes from the '38 Competition, have been set up. Entry is invited for any package, display, or machinery installation marketed during 1939.

The 4th Annual Modern Plastics Competition will close Sept. 23. Entries received so far indicate that this '39 contest will have a larger registration than ever before. The Competition is sponsored by *Modern Plastics Magazine*.

Glyco Increases Line

Glyco Prods. Co., N. Y. City, has added to its line of esters methyl oleate and methyl stearate, both of which are said to be useful as plasticizers for various kinds of coatings. Other uses for these esters include the manufacture of lubricants, dye and pigment carriers, and softeners for leather, rubber, etc.

Offers New Plastic

Pierce Plastics, Inc., of Bay City, Mich., is manufacturing "Permalon" fiber goods (fishing leaders, snells, etc.). Firm's manager, James E. Pierce, was formerly with Dow Chemical's engineering staff. "Permalon" is a vinylidene chloride plastic developed in the Dow laboratories.

Solventol Opens Branches

Solventol Chem. Products, Inc., Detroit, will establish branch offices and warehouses in Chicago, New York, Cleveland, Buffalo, Louisville, Minneapolis and other cities, in line with its expanded sales program.

Personal and Personnel

Louis A. Oberly, formerly with Hart & Harrington Co., Chicago, has been appointed Chicago representative for Royce Chemical Co., Carlton Hill, N. J. He is a graduate of Missouri School of Mines, Washington University, and Chicago University, and will serve as company's Midwest sales manager.

Willard E. Smith has joined the development staff of Borne Scrymser Co., N. Y. City. He will assist in the company's research work at the Elizabeth, N. J., laboratory. Mr. Smith, a Rutgers graduate and member of Phi Lambda Upsilon, will serve under the direction of E. H. Schmidt, company's chief chemist.

John A. Bauer, who has been for several years in charge of the N. Y. City office of Hanson-Van Winkle-Munning Co. of Matawan, N. J., has been transferred to Matawan, N. J. to assist L. M. Hague, vice-president in charge of sales. Irving A. Gemmell has been taken from the Engineering Department at Matawan and placed in the New York office.

Charles L. Anger has joined the Detroit sales staff of Hanson-Van Winkle-Munning.

Earl A. Radant has been transferred from Hercules Powder's Kalamazoo (Mich.) office to the newly-organized Paper Maker's Division in Willimansett, Mass. He will be in charge of the laboratory there.

News of the Specialty Companies

Cowles Detergent Co., Cleveland, has appointed N. P. Armstrong as representative in New England with headquarters in Boston. Frederick H. Hitchcock has been named a representative for the company in Michigan, with headquarters in Detroit, while E. W. Hutchinson, who has been representing Cowles in the Detroit area for a number of years, continues in that capacity.

Scholler Bros., Philadelphia, is planning the erection of a new laboratory building.

Cole Chemical Corp., Long Island City, N. Y., is expanding its plant from 18,000 sq. ft. to 28,000 sq. ft.

Associated Chemists, Inc., Chicago manufacturers of insecticide concentrates, has purchased the one-story brick building at 2947-49 N. Oakley ave., and the company's general offices and laboratories will be located shortly at this address.

Standard Chemical, of Cleveland, has leased a large, 3-story building on North 19th st. The firm will move this month into the new quarters, which afford more than twice as much floor space than before.

Soap, Detergent Specifications

The advisory committee of Committee D-12, engaged in formulating a set of specifications for soaps and detergents, has decided to hold its Fall meeting at the Hotel New Yorker, N. Y. City, on Monday, Oct. 30 and Tuesday, Oct. 31. Schedules of the sub-committee and section meetings will be released later.

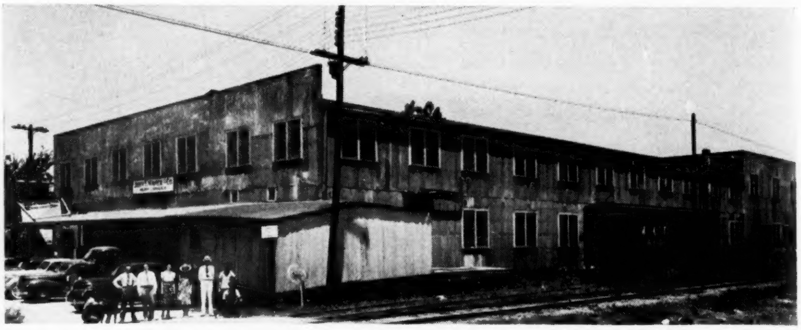
The report of A. S. T. M. Committee D-12 on Soaps and Other Detergents, made public earlier in the year, includes tentative revisions of definitions relating to the soap and detergent industry, as well as proposed new specifications for sodium metasilicate, trisodium phosphate, palm oil bar soap, palm oil chip soap, powdered built soap, and alkaline soap powder. Copies of this report can be had from the office of the A. S. T. M., 260 S. Broad st., Philadelphia.

Packaging Experts To Meet

Packaging Institute, Inc., will hold its First Annual Meeting Oct. 19-20, at the Edgewater Beach Hotel, Chicago. The Institute is concerned solely with the technical advancement and aspects of packaging, rather than with the commercial problems of the specialized groups comprising its membership. Represented at the Chicago meeting will be machinery manufacturers, suppliers, and designers, as well as production men who use packaging machinery and services.

Aid To Lubricating Oils

Monsanto has introduced "Santolube 31" and "Santolube 36," 2 alkyl esters of phosphorus acids, which are said to increase the film strength of lubricating oils and to help retard the corrosive action of auto engine oils upon crankshaft alloy bearings, most of which now include alloys of the cadmium-silver or copper-lead type.



John F. Maher & Co., well-known chemical distributor and specialty manufacturer in the Southwest, enlarges its plant and facilities at Houston headquarters.

Heavy Chemicals

Metal Derivatives Advanced Sharply

New European War Creates Boom in Industrial Chemicals —Imported Items Scarce and Higher In Price—Shipping In Chaotic State—Export Inquiries for Chemicals Heavy—

WHAT effect will the outbreak of hostilities in Europe have on the chemical industry and chemical prices? This was the topic of conversation whenever two or more chemical men met after the Labor Day holiday. "Oldtimers" recalled the wild orgy of speculation in chemicals in 1914 and wondered if similar conditions would prevail in the coming months. Others pointed out the radically different sales "set-up" in the industry today. Many expressed the opinion that higher prices were inevitable, but that more orderly marketing would prevail. Manufacturers today have direct contact with chemical consumers, in contrast to the position they were in at the beginning of the World War. And, of course, we in this country are entirely independent now on many chemicals which in 1914 were imported in large quantities.

August Tonnages Large

August chemical volume was large considering the fact that normally the month is one of the poorest. As the crisis in Europe became more acute in the last week or 10 days of August, buyers showed a definite desire to carry larger inventories. Coupled with this was a broad expansion in manufacturing operations in several of the large chemical consuming industries. Steel activity has been jumping ahead at a rapid pace. Automotive production at a low point early in the month started to mount in the closing week of August. All divisions of the textile field were exceptionally busy.

Remarkable price stability was noted in the past 30 days. Very few price changes were reported in industrial chemicals and many items which have been on the weak side firmed up considerably. Caustic and acetic acid were two important products that strengthened pricewise. Copper sulfate was advanced to $4.60 for carlots on Sept. 5 when the red metal soared upwards.

The tin derivatives with the exception of tin tetrachloride moved higher when the price of the metal was advanced. Higher quotations on silver forced higher prices for silver cyanide.

The general consensus of opinion in the trade is that demand for industrial chemicals over the next few months will show rapid expansion both for domestic consumption and for export. With Germany, France and England at war, it is almost a certainty that South America and other parts of the world will turn to the U. S. for large supplies of chemicals of every description. Indeed, inquiries have been pouring into this country in the past few weeks in large quantities. With shipping largely in chaos and insurance rates at record levels, the difficulties involved in filling orders are great and it may take several weeks before this situation begins to show improvement. There seems to be a general feeling that spot prices of many important chemicals will go higher. Already imported items have advanced sharply. An example of this is imported sodium silicofluoride. For the first time this year the item has shown a price advance and carlots (imported) at the end of August were quoted at 3¾c.

Inventories have already begun to take on distinct asset value. It would appear quite definitely that a "bull" market in staple chemicals is here.

Important Price Changes

ADVANCED	Aug. 31	July 31
Copper sulfate*	$4.60	$4.25
Silver cyanide	.33⅝	.33
Tin crystals	.38	.37½
Tin, metal	.49	.4845
DECLINED		
Tin tetrachloride	$0.24	$0.24¼

* Sept. 5.

McIver Promoted

D. T. McIver has been appointed as assistant to the president of Freeport Sulphur. Mr. McIver has been assistant general manager with executive duties since 1933, stationed at New Orleans. He will continue to serve in that capacity also, dividing his time between the company's properties and offices in Texas and Louisiana, and the N. Y. City offices.

New assistant to Freeport's president

Occupies Enlarged Offices

The Warner Chemical Company and California Chemical Company, Divisions of Westvaco Chlorine Products Corporation, now occupy their new offices comprising the entire 51st floor of the Chrysler Building at 405 Lexington ave., N. Y. City. Other subsidiaries of the Westvaco Chlorine Products Corporation and United Chemicals also headquarter in these offices.

Locates Headquarters at Falls

Hooker Electrochemical Co. has moved its main office to Niagara Falls, as of Aug. 21. The N. Y. City branch sales office will remain in the Lincoln Building, 60 E. 42nd st.

Completes K. C. Warehouse

Thompson-Hayward Chem. Co. has completed its Kansas City warehouse, erected during the summer in anticipation of a substantial increase in business.

Offers "Non-Fer-Al"

Pure Calcium Prods. Div., Diamond Alkali Co., has just published a booklet describing "Non-Fer-Al," a special grade of precipitated calcium carbonate for the preparation of batches for fine glassware.

New Louisville Jobber

C. W. A. McCann, who has resigned as a vice-president of Archer-McCann Co., will head the newly-formed McCann Chemical Co., Louisville, Ky. The McCann firm will distribute heavy chemicals, sanitary chemicals, laundry and dry cleaning supplies.

Ohio Chemical In Labor Pact

Signing of a contract between the Ohio Chemical Co., Hoboken, N. J., and the Cylinder Compressed Gas Workers' Union Local, Hudson County, N. J., was announced recently by Frank DeNike, business agent of the union. Covering one year, starting with August, the contract included wage increases, according to the announcement.

The Story of Paper Told

How man learned from a wasp that paper could be made from wood is told in the September issue of *Priorities*, house organ of Prior Chemical Corp., N. Y. City. In sketching the history of paper making the article indicates the far reaching effects on literature and learning which followed the discovery of this cheap and abundant source of pulp and the process for its conversion. The story holds a surprise for those who have thought the art of making paper originated with the Egyptians and equally surprising, perhaps, is the exposition of the extent to which chemistry is employed in a process usually considered purely mechanical. Still another surprise is the statement of the percentage of the world's annual forest yield used in making the tens of millions of tons of paper now produced. If your guess is within 10% of the correct figure you are good.

Coal-Tar Chemicals

Heavy Export Demand For Coal-Tar Solvents

Domestic Consumption Also Rises—Excellent Call For Intermediates and Dyes—Our Imports of Coal-Tar Chemicals From Germany Up Sharply In First 6 Months—

GENERALLY quiet conditions prevailed in the markets for coal-tar chemicals during the past month. In the last half shipping instructions for many items showed definite signs of expansion. On the whole, the volume of consumption was entirely satisfactory to producers.

Pricewise, the markets exhibited special firmness. Early in the month quotations on imported crude naphthalene were reduced 5c to a basis of $1.55, but with opening of hostilities abroad quotations were largely withdrawn. Importers could no longer give any assurances on deliveries.

Solvents Move in Large Quantities

The call for the principal coal-tar solvents, benzol, toluol, xylol and solvent naphtha improved considerably in the last two weeks of the month. Activity in the automotive centers has begun to increase with practically all producers tooled and ready to start manufacturing operations. Producers of industrial coatings have stepped up their schedules and look forward to an extremely busy period over the balance of the year. The upturn in automotive production has also caused the makers of plastics to increase their output and this naturally has affected the demand for phenol. Quite a little export demand for this item has developed and the unsettled price situation of the last few months seems about over.

Both crude and refined naphthalene were seasonally dull. Firmer price tendencies appeared in the markets for imported cresylic. Replacement of existing stocks will probably be difficult because of the present uncertain state of shipping. An increasing demand was reported for both intermediates and dyes, with prices steady and unchanged.

Coking activity continues to expand and still much greater expansion is expected in view of the almost certain gains in steel production that will take place in the next few months. This will, of course, make available much larger quantities of all coal-tar chemicals, but there is a definite feeling in the industry that shortages of at least certain items will develop. Already export inquiries on benzol, toluol and other coal-tar solvents have been tremendous and, barring a sudden cessation of war in Europe, this demand is expected to increase rapidly.

July Crudes Show Gains

Light oil production in July totalled 13,580,286 gals., compared with 12,471,396 gals. in June and with but 8,978,736 gals. in July of last year. Tar recovery in July amounted to 41,208,211 gals., as contrasted with 37,806,644 gals. in June and with 27,335,190 gals. in July of last year.

Important Price Changes

	Aug. 31	July 31
ADVANCED		
None		
DECLINED		
Naphthalene, crude, imp.	$1.55	$1.60

Exports, Imports Rise

Exports of coal-tar products were valued at $6,318,000 in the first half of this year compared with $4,979,000 in the first half of 1938. In this classification shipments of coal-tar colors, dyes, and stains increased from 4,753,000 lbs. to 5,082,000 lbs., and benzol from 4,594,000 gals. to 9,759,000 gals., preliminary statistics indicate.

Imports of coal-tar products increased sharply in the first half of the year to $10,742,000 in value from $7,330,600 in the same months of 1938, due to the heavy receipts of dyes, colors, and stains from Germany. With the war in Europe now a sad reality it would seem logical to assume that a sizable increase in our exports and a sharp decrease in our imports were likely possibilities.

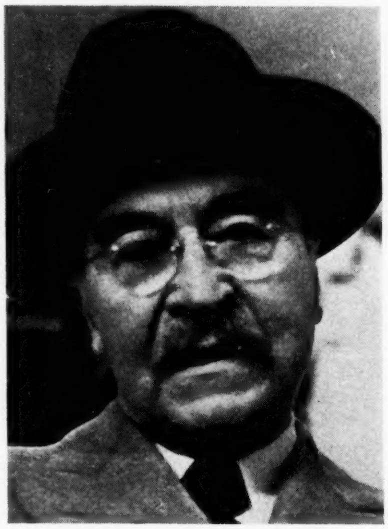
Offers New Color Modifications

Dr. W. G. Campbell, chief, Federal Food and Drug Administration, has offered for the approval of coal-tar chemical manufacturers several proposed modifications of the new regulations. Fees for the certification of small lots of colors would be reduced, according to the suggestions presented; the use of sodium benzoate as a preservative would be officially authorized; lot numbers may be stated on the invoices accompanying each order, instead of on the package label itself, thereby speeding up the packaging and distribution of small shipments. The Administration has invited manufacturers and distributors to make further suggestions for the speeding-up of the working of the new labeling and analytical requirements.

Carbide Acquires Bakelite

At a meeting held Tuesday, Aug. 29, 1939, the Board of Directors of Union Carbide and Carbon approved an agreement for the acquisition by Carbide of all the assets of Bakelite Corporation. Carbide is a producer of chemical raw materials and Bakelite a user of chemicals in its converting activities. The consummation of the agreement will bring valuable supplementary facilities to both organizations. The coordination of technical knowledge, research, production methods, and distribution facilities of these two organizations will result in the improvement of existing products, the development of new plastics and other chemical compounds, and the discovery of new uses for such materials.

Bakelite Corporation has been active in the manufacture and distribution of thermosetting plastics, principally of phenolic types. Over a quarter century ago Dr. L. H. Baekeland made his discovery which gave to the world a new material.



DR. L. H. BAEKELAND

Will he again return to his rocker and front porch in Yonkers?

This he called "Bakelite" plastic. During the intervening period products from this material have become well and favorably known in such forms as telephone receivers, automobile ignition parts, timing gears, radio cabinets, electric insulators, switch plates, bottle caps, lamp bases, pencils, buttons and novelties.

During recent years an increasing number of Carbide's synthetic organic chemicals have been used as raw materials in various plastics, including those made by Bakelite. Carbide also produces vinyl resins, recent developments being "Vinylite" resin for the laminating interlayer in the new high-test safety glass, and "Vinyon" for the production of synthetic yarn. As a producer of raw materials needed for making plastics, Carbide is taking a natural step in the diversification of its synthetic organic chemical business through the addition of the complementary lines of Bakelite products.

Under the agreement there will be distributed to Bakelite stockholders 187,500 shares of Carbide common stock exchanged for Bakelite's assets. Bakelite

USI **SOLVENT NEWS** *Reg. U. S. Pat. Off.* USI

September ★ A Monthly Series for Chemists and Executives of the Solvents and Chemical Consuming Industries ★ 1939

Acetone Sales Near All-Time High As New Uses Increase Demand

Textiles, Plastics, Coatings, Take Increasing Tonnages And New Solvent Applications Are Reported Almost Daily

Sales of acetone during the first six months of this year are at a pace which promises to top the 1937 all-time high of 68,772,268 pounds. Even more impressive is the rate of increase in acetone consumption during the past few years: 1933 saw acetone sales climb to the then unprecedented peak of 42,205,443 pounds, compared with a new high in 1931 of 25,853,-902 pounds.

What has been responsible for this recent increase of over 150%? The answer is found in a combination of two factors: The *value* of acetone as a general solvent, and the exceptionally favorable prices prevailing during the past two years.

Many New Solvent Uses

Although specific figures are not available, the rayon industry is still classed as the number one consumer. Probably, the next most important use of acetone is as a raw material for chemical synthesis followed by its use as an acetylene solvent. Closely following are the rapidly expanding fields of cellulose acetate and pyroxylin plastics, and the paint, varnish and lacquer industry, where, because of the growing popularity of synthetic resins, acetone is once again proving an increasingly popular general solvent.

In addition to the established volume uses of acetone, there are many miscellaneous, new applications which, taken in the aggregate, could account for a sizeable tonnage. And these uses continue to expand almost daily. A cursory review of the literature of the past few months reveals many interesting new and widely varied uses: a process for dyeing soft skins in leather; a solvent in producing hammered-metal finishes, and one-coat, mottled, multi-color paints; for the preparation of hard lac resins by cold polmerization; for the preparation of synthetic phthrocol (2-methyl-3-hydroxyl-1, 4 naphthoquinone), an anti-hemorrhagic; in admixture with benzene as a reagent for determining water in

(Continued on next page)

Cellulose Acetate Films Shown Best For Photo Records

WASHINGTON, D. C.—Cellulose acetate photographic films have demonstrated better "wearing" qualities and greater resistance to general deterioration than either the nitrate films or the viscose type of print, according to investigations made here by the National Bureau of Standards.

Because of the growing popularity of photographic methods of reproducing records, particularly in the form of miniatures, these tests were undertaken to determine the most satisfactory type of film.

Accelerated deterioration tests showed the acetate type film superior in "folding" endurance; images did not fade on exposure to heat or light; and it was generally "most stable." The nitrate film was found too unstable for longtime service requirements and the viscose film only comparable to paper of medium grade bleached wood fibre.

Complete reports of the tests and results obtained have subsequently been published and are now available.

New Thermo-Color Process Makes Changes In Paints Permanent

FRANKFORT-ON-MAIN, Germany—An improved method of preparing heat indicating paints wherein the paints permanently retain the colors to which they are changed upon registering specific degrees of temperature, is reported by the American Consulate General here.

The process, developed by a "well-known German chemical concern" employs the use of metal salts as pigments. Usual products of this type employ double metal salts such as mercuric iodide, silver iodide, and various arsenic, antimony and lead salts, and have the property of reverting to their previous color on cooling.

While the particular salts used in the new method are undisclosed, the report further states that on subjection to specific temperatures, the paints give off water, CO_2, ammonia, etc., changing their chemical composition permanently, and, concomitantly, their color.

New Hygienic Cap Closure

Test tubes, bottles, flasks, etc., containing bacteriological specimens and similar matter can be hygienically sealed with a new closure known as "Quicaps," which is said to be germ-

proof, moisture-proof, leak-proof, airtight and economical.

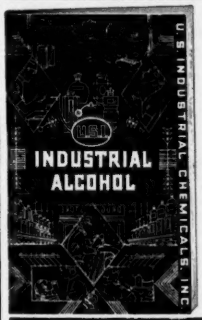
Primarily intended as a sanitary closure for baby nursing bottles, "Quicaps" are said to be finding widespread use in laboratories for general capping of glass equipment. To apply a "Quicap" a single transparent tissue sheet is removed from the box, the sterile or under surface is placed flat over the neck of the container and a cardboard "collar" is pressed over the tissue and down around the top of the bottle to form a tight fit. A gentle upward pull of the "collar" removes the tissue.

Reports 50 Methods For Identification of Fibers

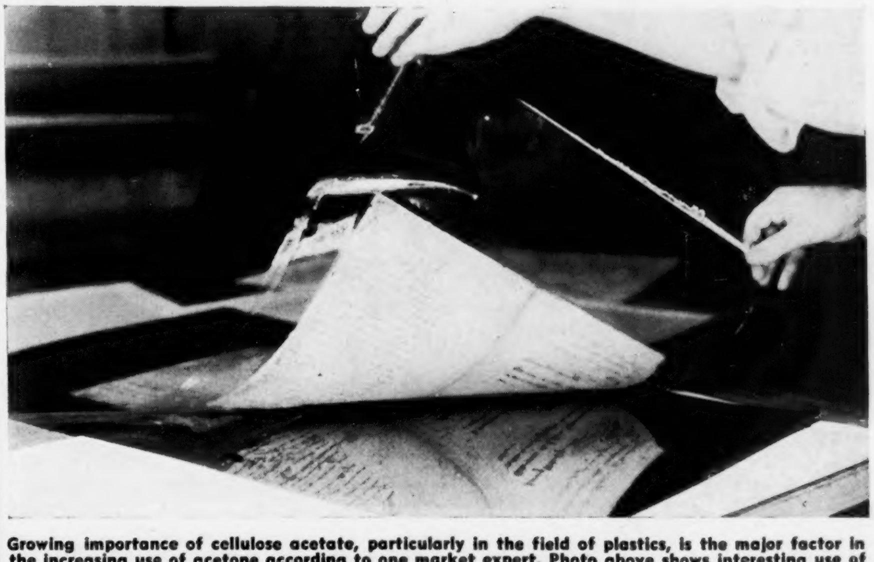
WASHINGTON, D. C.—A compilation of approximately fifty methods for the identification of textile, paper and cordage fibers has been published here.

Included are general directions for the preparation of samples for examination, and for the determination of percentages of constituents present, and other tests for orientation. Procedures are given for identification of various kinds of wood fibers; cotton, used cotton, mercerized cotton, flax, ramie, wool, damaged wool, casein, silk, "wild silk," and rayon fibers; also for hemp, jute, sisal, cocoanut and abaca.

Information on the complete report, "Microscopic Methods Used in Identifying Fibers," may be obtained by writing U.S.I. on your letterhead.



THE NEW U.S.I. ALCOHOL MANUAL, completely revised, including the new code system of classifying authorized uses for specially denatured alcohols, and including a special section on technical data and methods of testing, was announced in SOLVENT NEWS last month. Copies for users of industrial alcohol may be obtained by writing to U.S.I. Requests should be made on your business letterhead.



Growing importance of cellulose acetate, particularly in the field of plastics, is the major factor in the increasing use of acetone according to one market expert. Photo above shows interesting use of thin laminated sheets of clear cellulose acetate for preservation of documents at the National Archives in Washington.

September ★ **SOLVENT NEWS** ★ 1939

New Process for Printing Pyroxylin Coated Materials

ATHOL, Mass.—By the use of a pyroxylin solvent such as acetone or ethyl acetate in admixture with a volatile non-solvent such as ethyl alcohol, benzol or gasoline, when preparing pyroxylin coated materials, the surface of the finished product may be left sufficiently porous to form a bond with inks and water-sensitive adhesives, according to a patent issued an inventor here.

Formerly, the inventor points out, inks and non-solvent base adhesives would not flow and "bond" but would show a tendency to "ball" or separate irregularly into droplets. With the binary mixture of a solvent and small proportion of non-solvent, however, the surface is left microscopically porous without having a blushed appearance.

SAFETY IN HANDLING AND STORAGE of inflammable solvents in drums is the subject of an article in the four-page mail edition of SOLVENT NEWS for August. From the original report of the National Safety Council, precautions are given for minimizing the fire hazard, insuring maximum safety to handlers and plant workers. Additional copies of the issue may be obtained on request. Ask for Bulletin.

"Insist on Freshness" To Avoid Shellac Troubles

PITTSBURGH, Pa.—Squarely on the nose of most shellac troubles hits one manufacturer in this city in a recent article when he says: "Save yourself grief and money by buying only fresh shellac . . . in moderate quantities . . . and keep stocks revolving, disposing of the oldest first . . . and encourage your customers to do likewise. Shellac is very sensitive to heat (and) storage in hot places causes a rapid darkening, loss in drying, and precipitation and coagulation of the wax content."

Sandalwood Oil Recovered By Solvent Extraction

CALCUTTA, INDIA—Use of ethyl alcohol as a solvent in the recovery of sandalwood oil from sandalwood is reported here by A. Nagaraja Rao, research worker, who developed the process. The ethyl alcohol may be utilized even for the recovery of oil from oleoresin after the same solvent has been used during the first stage of the process, by treating the sandalwood with suitable concentrations. It is also stated that the oil so obtained is superior to that obtained by the usual commercial methods.

Best Way to Protect Insects — Embalm 'Em

WASHINGTON, D. C.—A preserving fluid for large insects which keeps their color unchanged and protects them against museum pests, such as mice, flies, moths, is prescribed in a recent number of *Science.*

The insects are injected or immersed in a fluid of the following composition:

Toluene or Xylene	60 cc.
Tertiary butyl alcohol	25 cc.
Ethyl alcohol	15 cc.
Phenol	5 gms.
Paradichlorobenzene	20 gms.

Add ten drops of balsam in xylene as used in microtechnique.

The ingredients should be mixed in the order given above.

In keeping with the production-price trends which have characterized the U. S. chemical industry for the past two decades, acetone prices have been brought down almost in direct ratio to the increasing demands for this popular solvent and chemical raw material.

Acetone Sales Continue Up

(Continued from previous page)

BuOH; in preparation of a rhodamine derivative—cellulose acetate composition; in preparing water swelling pudding starches; and for use with dry-ice in cryotherapy. This brief list serves to show the multiplicity of new applications for acetone and gives an indication of the wide range of its solvent powers.

The present importance of acetone as an industrial chemical, however, continues to stem from its use as a raw material—for artificial silks, plastics, coatings, dyestuffs, explosives and photographic films, and its more specialized uses as a solvent for fats, waxes, gums, dextrin, petroleum products, a degreasing and degumming agent; cosmetics manufacture and medicine accounting for considerable demand.

As headquarters for solvents and solvent chemicals, U.S.I. continues to supply acetone of highest quality to meet the diversified needs of American industry.

Editor's Note—A review of the history of acetone production from 1914 through 1934 appears in SOLVENT NEWS for May, 1935.

TECHNICAL DEVELOPMENTS

Further information on these items may be obtained by writing to U.S.I.

A new cleansing solvent which is non-inflammable, highly penetrating, and clear in appearance has been announced, and it is said to combine soap and water detergency with the high solvent power of benzine. It is also claimed that stampings and small metal parts dipped in the solvent acquire a cleansed appearance without any resulting marking or loss of weight. **(No. 250)**

U S I

Two improved floor resurfacing materials, mixtures of gums and fillers and reported to contain no asphalt-bound concrete or cements, are available. One sets in 4 to 12 hours; the other can be "ridden over" immediately according to the manufacturer. **(No. 251)**

U S I

A new drum opening tool for cutting the heads from steel barrels and drums is announced. The device consists of a special pair of jaws on the end of 2-foot handles, is hand operated, and is said to circumnavigate the top of a standard 54-gal. drum in approximately 2½ minutes. **(No. 252)**

U S I

A retarder to prevent "blushing" of nitrocellulose lacquers on drying in high humidities is reported. Claimed to have wide resin tolerance and high nitrocellulose solvency, this new product is reported to improve film strength and adhesion without materially increasing drying time. **(No. 253)**

U S I

Parquet and similar wood designs in thin veneer impregnated with a plastic composition are reported to provide a permanently-finished, smooth surface material for designers, decorators, architects. Three standard panel sizes and several varieties of exotic woods are available and can be mounted to any desired backing, according to the manufacturer. **(No. 255)**

U S I

A new electrical device to heat lines handling heavy viscous oils from the intake to point of use, is announced. It is thermostatically regulated, and, for furnace lines, is reported to permit the use of Bunker C or No. 6 fuel oil without trouble. **(No. 256)**

U S I

New sealing materials claimed to prevent water seepage through earth, wood and concrete are offered for use in sealing storage reservoirs, small lakes and streams, etc. The materials are supplied as a powder and are said to form a gelatinous mass, filling the voids in the retaining or construction materials. **(No. 257)**

U S I

For checking electrometric pH apparatus, a new series of reference standards is announced under the name of Hydrion Buffer Capsules. In the form of dry powder, packaged in capsules, the new product is said to save time and be more stable than liquid standards frequently employed. **(No. 258)**

U S I

To insure adhesion of paint to galvanized or other metal containing a large percentage of zinc, another new product has been announced. The manufacturer states that only one application cleans the metal of all ordinary dirt, fingermarks, oil, and builds up a surface film which produces the perfect bond for the paint. No other treatment of the metal is required. Free 8-oz. sample will be supplied by the makers upon request. **(No. 259)**

preferred stockholders will be entitled to receive for each preferred share 1¼ shares of Carbide stock, the remainder of the Carbide stock to be divided ratably among the Bakelite common stockholders. The agreement will become effective upon ratification by the holders of each class of Bakelite stock.

Personnel

Dr. Elbert C. Lathrop, an authority on the commercial production of cellulose products, will be in charge of the work on the utilization of agricultural wastes at the Northern Regional Research Laboratory. The Laboratory, a unit of the U. S. Bureau of Agricultural Chemistry and Engineering, will develop new and improved methods for the production of cellulose products from stalks, straw, hulls, and cobs.

E. A. Faulhaber has retired as vice-president of Compressed Industrial Gases, Inc., Chicago, but will continue as a director of the company.

F. Dean Hildebrandt is now in charge of Prior Chemical Corporation's new Chicago office in the Carbide and Carbon Bldg. on North Michigan ave. He has been the N. Y. firm's Western representative since the first of the year.

The Monarch Chemical Co. has been organized in Kingston, Pa., by Richard E. Davis. He will manufacture and distribute chemicals for the laundry trade.

Albert I. Keegan, formerly with the U. S. Food and Drug Administration and the Chemistry Faculty of Armour Institute of Technology, has opened an office at 53 W. Jackson Blvd., Chicago.

Bernard L. Oser has been appointed vice-president of Food Research Labs., Inc., N. Y. City. He will continue to direct the activities of the organization, a pioneer in biological assaying of vitamins.

CHARLES L. HUSTON, JR.

Joins Lukens Steel as director of personnel of main company and subsidiaries.

Solvents

Spot Price of Acetone Advanced

Sharp Reductions In Butyl and Ethyl Crotonates—Petroleum Solvent Prices Steady—Coatings Manufacturers Increase Production—Higher Glycerine Prices Likely—

AN improved demand was in evidence for most of the important solvents in the last half of the month following the normal seasonal summer slack period. Producers of industrial coatings have expanded manufacturing operations to meet the requirements of the automotive manufacturers now in production on 1940 models.

Significant Price Rise

After a long period of generally declining prices, indications point to a reversal of that trend. One manufacturer of acetone on Aug. 21 raised the spot quotations to a basis of 5c in tanks, 6c for drums in carlot quantities, and 6½c in l.c.l. quantities. In view of the fact that acetone pricewise has been one of the weakest in the so-called solvent group this move is of more than passing interest and is of more than ordinary significance. The war will, of course, have a direct bearing on all of the solvents. Export inquiries have started to pour in on domestic manufacturers. Countries that have been dealing with Germany, England and France are now in a predicament and must seek sources of supply in the U. S. There is strong likelihood that this situation will force producers to widen the spread between contract and spot prices on most items.

On the downward side of the market sharp declines were announced in butyl crotonate and ethyl crotonate. In each case the drop amounted to 40c. On the new basis, both products are quoted at 35c delivered in 55-gal. drums. Increased consumption of these items has made it possible to lower prices still further and this will undoubtedly open up further fields for consumption.

Demand for the principal petroleum solvents held up remarkably well in the last 30 days with the greatest interest being displayed in rubber solvent. Increasing demand for v.m. & p. naphtha, petroleum thinners and lacquer solvent was reported, but less interest was noted in cleaner's naphtha and Stoddard Solvent in most parts of the country. Some price weakness was said to prevail in the tank-wagon price structure in certain parts of the midwest. A stiffening in the market for crudes was taken in many quarters that higher solvent prices were likely and this situation was further augmented when war broke out in Europe over the Labor Day week-end.

Competitive conditions continued to characterize the markets for industrial

Important Price Changes

	Aug. 31	July 31
ADVANCED		
Acetone, tks.	$0.05	$0.04¼
drs., carlots	.06	.05¾
DECLINED		
Butyl crotonate, drs.	$0.35	$0.75
Ethyl crotonate, drs.	.35	.75

alcohol. This condition was decidedly more pronounced in the Metropolitan area than in any other part of the country. The new war is likely to see greater demands placed on the sugar producers which in turn will have a strengthening effect on molasses quotations. A much firmer price structure in alcohol was apparent immediately following the declaration of war against Germany by England and France. This will have a definite effect on the anti-freeze price structure. Purchasing of anti-freeze by dealers so far is said to have been satisfactory to the producers in view of the keen competition from other materials that now exists.

Ethyl alcohol production in July amounted to 17,642,710 proof gals., a good increase over the like month of '38, when only 16,370,042 were produced. In June, the output was somewhat less, 16,827,178 gals.

C. D. output totaled 542,979 wine gals., considerably less than half of the 1,303,340 gals. produced in July, '38; June's yield was 861,138 gals. Removals of C. D., 527,689 gals., were correspondingly less, for the July, '38, volume was 1,221,990 gals., and June's was 813,449. Stocks at the month-end decreased to 670,229 gals., from the previous July's 779,849, but were greater than June stocks, which amounted to 655,994.

S. D. formulae amounted to 6,893,739 gals., as compared with 5,407,077 in the like '38 month. June production of S. D. came to 7,304,529 gals. Removals of S. D. in July, totaling 6,867,719 gals., were well above last July, when only 5,419,830 were removed. In June, removals were greater in volume, 7,130,302 gals.

Firm Outlook in Glycerine

The new European war has changed considerably the status of glycerine. No longer will imports from abroad be available and indeed the demands for export are more than likely to show a sharp rise very shortly. A much firmer market is generally anticipated, but whether or not the run-away market of a few years back is duplicated remains to be seen.

Fine Chemicals

Rush To Buy Quicksilver On War News

Stocks Scarce as Buyers Try to Supplement Inventories—Imported Items Firmer and Difficult to Obtain—Menthol Up—Good Demand for Citric—Botanicals Strong—Agar Firm

PERHAPS in no other branch of the chemical industry did the declaration of war abroad bring more consternation than it did in the fine chemical, pharmaceutical, essential oil, and aromatic fields. It is in these groups, particularly, that we are the most dependent upon outside sources, and while happily, conditions do not even begin to approximate the state of affairs that existed just 25 years ago, nevertheless there will be serious disarrangements that will have to be met and dealt with in some way. Imported items, which even a few weeks ago were receiving but scant attention from buyers, are now in heavy demand. Shipping has been almost completely disorganized, rates have been advanced and so has war risk insurance. Importers holding spot stocks of many important items are carefully rationing these in an effort to take care of regular customers until such time as replacements can be obtained.

Buying activity became specially heavy following the Labor Day holiday. With the actual declaration of war coming during the 3-day holiday, this was the first opportunity for buyers to begin to build up inventories. The volume of business during August, however, was particularly heavy. This was due both to the generally better conditions at home and also a fear on the part of many purchasing agents that no peaceful settlement of the European question would be reached.

Mercury Gains $17 in a Day

Highly spectacular was the mercury market in the past 30 days. In the first half quotations declined, but in the closing days not only were the former price levels again reached, but new highs were made and on Tuesday, the first day after the Labor Day holiday, quotations were advanced $17 per flask to $110. At the month-end no changes in the mercurials had been made, but undoubtedly upward revisions are inevitable. Speculation is rife as to whether Italy will cast her lot with Germany or will continue to hold indefinitely to her present state of neutrality; also as to whether Spain in the event of Italy siding in with the Reich will break its Cartel arrangement with Italy. However, in any event there is bound to be a tremendous increase in the demand for domestic metal. Momentarily foreign metal is on a nominal price basis. As shipping conditions become more settled, this situation is likely to change.

The sudden rush to cover caused importers of Japanese menthol to advance quotations to $3 per lb. All signs seem to indicate even higher prices in the near future. Agar was another item that went into higher price ground for the same reason. While at the month-end quotations on natural camphor were unchanged, importers expressed the opinion that higher prices were extremely likely. Stocks of most imported botanicals are scarce and momentarily quotations are largely nominal in character.

Important Price Changes

ADVANCED

	Aug.31	July 31
Agar agar No. 1	$1.50	$1.45
Cadmium, metal	.55	.50
Cocoa butter	.10½	.10¼
Menthol, Jap.	3.00	2.90
Mercury	110.00*	86.00
Silver nitrate	.27¼	.26⅞

DECLINED

None

* Sept. 5.

Because of the exceptionally hot weather which prevailed over most of the country, shipments of citric and tartaric acids were heavy. The price structure of both items was firm and unchanged. In the essential oil field practically all important members of this group moved into higher ground as soon as the news of the war broke, including lemon oil, orange oil, clove oil and others.

U. S. P. XI Revisions

The Second U. S. P. XI Supplement, just issued, includes 14 new chemicals and 85 revisions. The new listings are as follows: Ascorbic acid, mandelic acid, cyclopropane, methylrosanilin chloride, nicotinic acid, natural vitamin A in oil, natural vitamins A and D in oil, purified cotton, soluble pentobarbital, sulfanilimide, surgical gut (or catgut), thiamine hydrochloride, tribasic calcium phosphate, and tribasic magnesium phosphate. The Second Supplement becomes official Jan. 1, 1940, and is the third in the set of volumes comprising the U. S. P., XIth Revision.

Merck Employees Picnic

Approximately 600 workers and their families enjoyed the second annual family outing of the Employes' Organization of Merck & Co., Inc., held Aug. 12 in Rahway, N. J. George Lennox and Edward Tombs were co-chairmen in charge.

New Alcohol Regulations

The sale of denatured alcohol for known use as a beverage has been prohibited by the Commissioner of Internal Revenue, in an amendment to article 146-A of regulation No. 3.

DCAT Fall Meeting, Oct. 19-21

Fourth Annual Fall Meeting and Golf Tournament of the Drug, Chemical and Allied Trades Section of the N. Y. Board of Trade will be held Oct. 19 to 21, at Skytop, Pa. Business sessions will be held in the afternoons, while mornings will be devoted to golf. Other highlights include entertainment for the ladies, movies, a "Get Acquainted Party" and a banquet on the final evening. Chairmen of the various committees are: Ralph E. Dorland, arrangements; Victor E. Williams, banquet; S. B. Penick, Jr., "Get Acquainted Party"; Ira Vandewater, golf; A. A. Wasserscheid, ladies committee; Thos. R. Farrell, program; Turner F. Currens, publicity; John A. Chew, reception, and Robert B. Magnus, transportation.

Fansteel Metallurgical Co., N. Chicago, Ill., will redeem on Oct. 2 all outstanding first mortage and collateral 6% sinking fund gold bonds, due Feb. 1, 1943. Bonds will be redeemed at 110, representing the total bonded indebtedness of the company.

DR. ROBERT S. TIPSON

DR. WARNER CARLSON

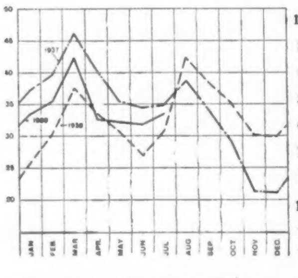
Dr. E. R. Weidlein, director, Mellon Institute, announces new appointments in the Dept. of Research in Pure Chemistry. Function of this department has been growing steadily. Dr. Tipson comes from Rockefeller Institute; Dr. Carlson from Ohio State University.

Raw Materials

Swift Price Rise In Important Commodities

Declaration of War Abroad Starts Hysterical Wave of Buying and Speculation—Many Markets Nominal—Shipping Space Difficult to Obtain—Washington Watching Price Trends—

A WAVE of hysterical buying in the chief commodities developed when the markets opened on Sept. 5, the first trading day following the declaration of war in Europe. Prices soared in every item and considerable confusion existed in many of the markets. Buyers and speculators jumped into the picture, the former desperately trying to accumulate reserves against the strong possibility of still higher prices, and the latter in the hope of heavy profits. On the following day some profit taking was in evidence and considerable irregularity developed. Leading the general advance were the metals and sharply higher prices were posted for copper, lead, tin and zinc.



Shoe production shows gain over '38 totals. Bureau of the Census.

What the future course of the commodity markets will be over the next few weeks is difficult to guess, but the general opinion seemed to be that still higher prices are inevitable. Government officials in Washington are reported to be keeping an eye to the commodity markets, but are said to be proceeding very cautiously on the question of restricting trading.

Heavy Demand for Tanstuffs

Considerable buying of tanning materials was reported in August even before the crisis reached what might be termed the really acute stages. Large quantities of mangrove bark, myrobalans, sumac, and valonia changed hands as consumers strove to replenish inventories. While prices did not advance, buyers were forced to pay much higher war risk insurance rates. This did not seem to have any deterring effect.

After several weeks of weakness the corn derivatives early in the past month turned upward when the grain markets began to reflect the possibility of war in Europe. Buyers were reported to have entered the market in a real way.

A great deal of confusion existed in the markets for natural gums in the latter part of the month and in the first few days of September. Prices in most instances were practically nominal. Importers were unable to determine what replacement costs would be and hesitated to set prices under these difficult circumstances.

Important Price Changes

ADVANCED	Aug. 31	July 31
Copper, electrolytic*	$0.12	$0.10¼
Corn sugar, tanners	3.04	2.89
Corn syrup, 42°	3.07	2.92
43°	3.12	2.97
Dextrin, British Gum	3.70	3.55
Corn, Canary	3.45	3.30
White	3.40	3.25
Lead, metal, E. St. Louis*	.055	.0460
Starch, corn pearl	2.55	2.40
powdered	2.65	2.50
Sumac, grd.	66.00	65.50
leaf	69.00	68.00
Wax Bayberry	.27	.25
Wax Carnauba, No. 3, chalky	.29½	.29
Yellow, No. 1	.45	.41
No. 2	.44	.40
Wax Japan	.13½	.12½
Zinc, E. St. Louis*	.06	.0470
dust	.0675	.0660
DECLINED		
Albumen, egg, dom.	$0.58	$0.60
Gum Dammar, C.	.13½	.14⅛
A/D	.12¾	.13⅝
Myrobalans, J1	24.00	26.00
J2	19.00	20.00

* Sept. 6.

Prices on shellac were nominal in London and Calcutta during the uncertain days before the final declaration of war. Sellers abroad or in this country showed very little desire to accept large orders. Belief in general is that prices will advance sharply and suppliers in this country are naturally unwilling to accept orders at current price levels for fear that the primary markets will go much higher and it will be impossible to cover.

The international situation had several repercussions in the wax markets in the past few weeks. The market for Montan practically ceased to exist when it became apparent that shipments from Germany would be unable to get through. What little material was available in this country was being closely held and quotations were strictly nominal. Increased war risk insurance rates were given as the reason for sharply higher prices for Bayberry. Increased quotations were noted for No. 1 and No. 2 grades of Carnauba. Business in the item was brisk. Likelihood of still higher replacement costs in Japan caused importers to boost local quotations to a basis of 13½-14c.

Interest in naval stores was largely routine in nature throughout the period under review. Prices on all grades of gum rosin were off when comparison is made with quotations on Aug. 31 and the corresponding day a month earlier. Naval stores failed to join the general procession of higher commodity prices. Not generally in the class of "war materials" there was not the same speculative interest as there was in the metals, grains, etc.

Isco Announces New Waxes

Innis, Speiden & Co., N. Y. City, has placed on the market a new wax compound ("Isco" Refined Wax No. 352) which is said to be an excellent substitute for the more expensive Carnauba wax. Compound melts at 180½-181½° F., and has already found numerous uses in industry.

Washington

QUESTION of putting private trucking under safety regulations has come to the fore again. Recent recommendations of I.C.C. Examiner Snow following exhaustive hearings make it appear likely that interstate private trucks will be placed under hours of service and safety regulations like those now applicable to motor carriers. Companies that would be affected have until Sept. 29 to file briefs.

On the closing day of the session last month, Congress appropriated $10,000,000 for the purchase of strategic and critical materials essential to the national defense, for storage by the army and navy. Among the strategic materials are listed aluminum, antimony, chromium, coconut-shell, char, ferrograde, manganese, manila, fiber, mica, nickel, optical glass, quartz crystal, quicksilver, quinine, rubber, silk, tungsten, and wool. Critical supplies include those of asbestos, cork, flaxseed, fluorspar, cadmium, cryolite, graphite, hides, iodine, kapok, nux vomica, opium, phenol, picric acid, platinum, titanium, toluol, scientific glass, and vanadium.

Soap manufacturers and tallow and grease interests have protested the proposals for subsidizing lard and cottonseed oil, fearing that such a move would bring about lower prices for fats and oils in general. At their recent Summer meeting in Atlantic City, members of the Middle Atlantic Renderers Association wired a protesting resolution to the Department of Agriculture, urging that the proposals be dropped.

Study Phosphate Reserves

Just before the close of Congress in August, the phosphate investigation committee was granted a $5,000 appropriation, in order to complete its work of determining the extent of our phosphate resources and of related minerals. The committee has until Jan. 15, '40, to report upon its findings. Tentative arrangements have been made for an inspection of Black Hills manganese deposits, and for a visit to the potash deposits near Carlsbad, N. M.

Agricultural Chemicals

Late Summer Lethargy in Raw Fertilizer Materials

Natural Ammoniates Quoted Higher—European War May Hamper Potash Deliveries—July Tag Sales Off—Mixers Expect Hostilities Will Increase Fertilizer Consumption—

THE past few weeks have been quiet ones in the markets for raw fertilizer materials. Mixers in most cases had previously placed their orders for their minimum requirements for the coming season. Dealers were engaged primarily in "mopping up" loose-ends concerning contracts and very little spot purchasing was reported. The most interesting point of news during the month was the sharp decline in the fish scrap market following several months of firmness. Large hauls were responsible for the break and with it, according to reports from Baltimore, came an influx of purchasing. Ammonium sulfate moved up 25c per ton at the month-end in accordance with the contract terms on this item.

The natural ammoniates firmed up somewhat in the last 30 days. Buying was light and most of the interest displayed was in the feeding grades. Domestic bone (raw) was off $1 to a basis of $27, while domestic steamed meal was off a like amount to a basis of $26 at Chicago.

Potash importers reported last month that contracts negotiated for future delivery of material have been specially satisfactory. Concern naturally exists now as to what effect the war in Europe will have on potash deliveries from abroad. Mixers will probably revise considerably their previous estimates on next season's output in view of the strong possibility that Europe and other parts of the world will be heavy buyers of foodstuffs and other agricultural products necessitating greater acreages and more intensive fertilizing.

July Tag Sales Off Slightly

Total tax tag sales in 17 states in July amounted to 51,633 tons, according to the N. F. A. This was somewhat less than sales in the same month in the past 2 years. July sales are relatively small, having accounted for only 1.1% of the annual total in recent years. Fluctuations in July from year to year are rather erratic and changes are not very significant. A sharp increase over last year was reported by Mississippi, which resulted in a 26% increase for the South as a whole.

For the first 7 months of the year total sales were 3% larger than in the corresponding period of '38, but they were 9% below the January-July period of '37. Seven of the 12 southern states reported increases over last year, with the largest gain occurring in North Carolina. An increase in Indiana was more than sufficient to offset tonnage losses in the other four States in the Midwest.

Important Price Changes

	Aug. 31	July 31
ADVANCED		
Blood, dried, dom., N. Y.	$2.75	$2.50
high-grade, Chgo.	2.70	2.35
Tankage, high-grade, Chgo.	3.25	3.00
imported	3.10	3.00
unground	2.95	2.75
DECLINED		
Bone, raw, dom.	$27.00	$28.00
meal, steamed, dom.	26.00	27.00
Fish scrap, menhaden	3.15	3.35
Nitrogenous mat., imp.	2.25	2.40

Sulfate Output Up 10%

July's ammonia sulfate output was 46,526 tons, about 10% over the previous month's total of 42,253 tons, and 53% better than in July of '38.

Exports, Imports Show Losses

In the 1938-1939 fiscal year exports totaled 1,504,697 long tons, a decrease of 9% from the preceding year. Total tonnage was more than in 1936-1937, however. There was a decline in all classes of nitrogenous materials and land pebble rock.

Total import tonnage in the 1938-1939 fiscal year was 10% below the preceding year and was also less than 2 years ago. Decreases were pronounced in imports of sodium nitrate, 20% superphosphate, muriate of potash, potassium-sodium nitrate mixtures, and miscellaneous materials.

"Super" Production Down 12%

Superphosphate production in the fiscal year 1938-39 totaled 3,005,979 tons, a decline of 12% from the preceding year. In the first half of '39 production was only slightly below the corresponding period of '38, following a sharp drop in the last half of '38. Production in the past year fell off more in the North than in the South.

Total shipments in 1938-39, according to the statement of the reporting acidulators to the N. F. A., underran 1937-38 by 3%, with the more pronounced decrease taking place in the North. An increase was reported in shipments to mixers, but this was more than offset by declines in shipments to other acidulators and to consumers. The drop in mixed goods shipments was slight.

Since production fell off in the last year substantially more than did shipments, stocks at the close of June were well under the level of June, '38. The larger part of the decline occurred in the North, where the curtailment of production was most pronounced. Stocks of bulk superphosphate on June 30 were 19% smaller than a year earlier, while those of base and mixed goods were 17% smaller.

Closes Baltimore Office

American Potash & Chem. Corp. has discontinued its Baltimore office, as of September 1st. E. M. Kolb, formerly Baltimore manager, will be located at company's N. Y. City headquarters.

Davison Announces Changes

Davison Chem. Corp., Baltimore, has appointed J. E. Ames, Jr., manager of its Norfolk Division office. A. D. Kincaid, former Norfolk manager, is now in the home office.

Nitrate Sales' New Officers

Kenneth H. Rockey is the new board chairman of Chilean Nitrate Sales Corp., N. Y. City. He succeeds Gustavo Ross, resigned. J. Albert Woods, former 1st vice-president, is the new president of the corporation.

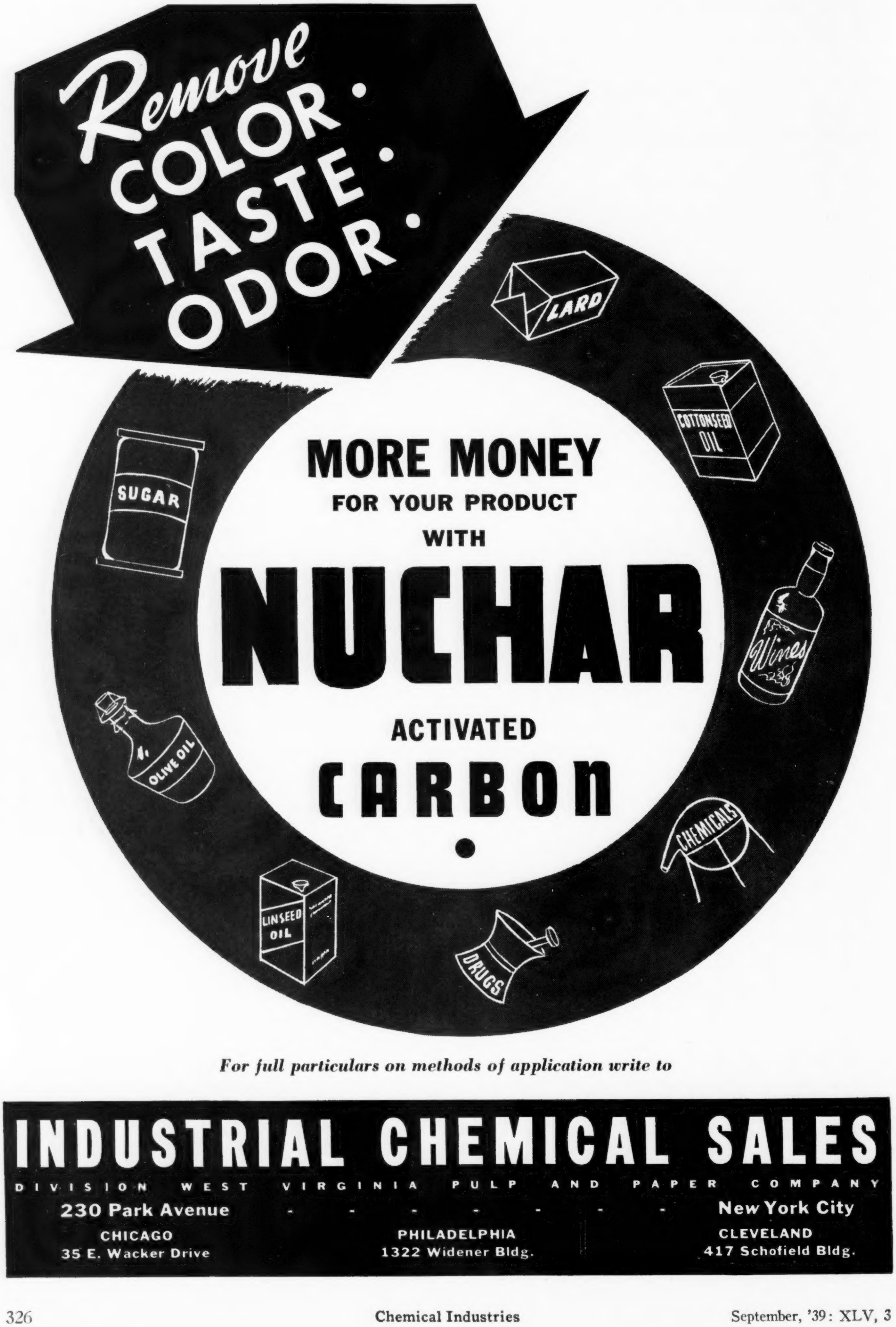
J. ALBERT WOODS

New Chilean Nitrate Sales head—takes reins at a difficult time.

Another Sweet Potato Plant

The State of North Carolina, through its Conservation and Development Dept., is trying to establish a sweet potato starch industry. This activity was inspired by the successful operation of the newly-created sweet potato starch industry in Mississippi. The starch would be consumed by neighboring cotton mills; the residual plant pulp is claimed to be saleable as cattle feed to supplement cottonseed meal.

Industrial Instruments, Inc., has moved from Bayonne, N. J., and is now located in much larger quarters at 156 Culver ave., Jersey City, N. J.


Remove
COLOR ·
TASTE ·
ODOR ·
LARD
COTTONSEED OIL
SUGAR
Wines
OLIVE OIL
CHEMICALS
LINSEED OIL
DRUGS
MORE MONEY
FOR YOUR PRODUCT
WITH
NUCHAR
ACTIVATED
CARBON
For full particulars on methods of application write to
INDUSTRIAL CHEMICAL SALES
DIVISION WEST VIRGINIA PULP AND PAPER COMPANY
230 Park Avenue - - - - - - - - New York City
CHICAGO
35 E. Wacker Drive
PHILADELPHIA
1322 Widener Bldg.
CLEVELAND
417 Schofield Bldg.

Oils and Fats

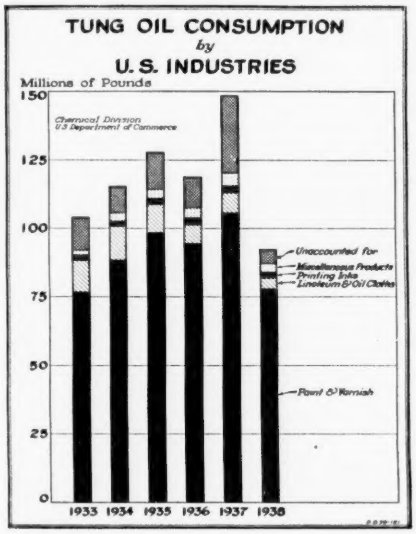
Buyers Rush To Cover Future Requirements

War Changes Outlook—Heavy Export Demand Likely To Develop—Chinawood Supplies Dwindle—Other Paint Oils Higher In Price—Huge Soybean Crop Effects Oil Price—

IN 24 hours the outlook in the fats and oils markets changed completely when Great Britain and France declared war on Germany. There is always, of course, an international tinge to this group of commodities, but the tie-up is now much greater and very likely from now on the international aspects will predominate.

Trading in fats and oils during most of August was in fairly heavy volume. As the seriousness of the European crisis became more apparent, buyers dropped the "hand-to-mouth" purchasing policy and began to accumulate some backlog of materials. Despite this increased interest, however, prices of corn oil, linseed oil, peanut oil, and soybean oil lost ground, largely due, of course, to the bumper crops harvested this year. Cottonseed, too, lost price ground in sympathy with lard. Most of the animal fats and oils were also off in price.

Advances in August were almost solely limited to the paint oils paced by Chinawood. While the nominal price of 21c in tanks in New York appeared to be the prevailing quotation at the month-end, very little material seemed available at this figure. Some sales were said to have been closed at 22c in tanks and as high as 23½c in drums. The continued inability to get



sizable deliveries of tung oil through from China forced higher prices for competing drying oils, such as oiticica and perilla. The fish oils lost ground during the month and lower quotations were made for the refined grades of menhaden and sardine. There has been an exceptionally large catch of menhaden this summer and buyers were uninterested until concessions

Important Price Changes

ADVANCED	Aug. 31	July 31
Oil Chinawood, drs.	$0.23	$0.22
Oil Cod, Newfoundland	.33	.32
Oil Oiticica	.17	.16
Oil Olive, denat.	.88	.82
Oil Perilla, drs.	.12½	.11½
tks.	.12	.11
DECLINED		
Oil Babassu	$0.05⅞	$0.06
Oil Coconut, Manila, crude	.02⅞	.03
Oil Corn, crude, tks.	.05⅛	.05¼
refined, bbls.	.07½	.08⅜
Oil Lard, common No. 1, bbls.	.07½	.08⅛
Oil Linseed, raw, tks.	.078	.083
Oil Menhaden, crude, tks.	.21	.26
ref'd. alkali, drs.	.062	.064
tks.	.056	.058
Oil Oleo, No. 1	.07¼	.08
No. 2	.06¾	.07½
Oil Peanut, crude, tks.	.05	.05¼
ref'd., edible	.08¼	.08¾
Oil Red, dist., tks.	.06¼	.06½
Oil Sardine, ref'd, alk., tks.	.056	.058
Oil Soybean, dom., crude, tks.	.04½	.05
Oil Tallow, acidless, tks.	.07	.08
Oil Whale, ref'd nat.	.071	.073
winter bleached	.075	.077

were made. A ¼c decline was noted in several grades of red oil.

With only two days following the declaration of war to judge by, it is difficult to try and interpret the outlook for fats and oils over the next few months. Prices generally turned extremely bullish in sympathy with most of the commodity markets. Linseed, for example, on Sept. 6 reached 9c in tanks at New York and sellers were unwilling to make very large commitments even at that figure. The seller of fats and oils is now the cautious one—not the buyer. On Sept. 5 it took but 17 trades to put cottonseed oil up the 100 point rise permitted in one day. Contracts were practically unobtainable.

U. S. In Export Role

Quite clear is the fact that Europe, at least England and France, will be heavy buyers of fats and oils of all descriptions. These are items that are not affected by the Neutrality Act. What appeared to be serious surpluses even so short a period as two weeks ago now seem like extremely small stocks. War has literally turned the fats and oils markets upside down.

Personnel and Personal

Warren T. Reddish is now vice-president in charge of manufacture, developments and specialty sales, W. C. Hardesty Co., N. Y. City. He was formerly vice-president of the consolidated Emery Industries, Inc., and Twitchell Process Co., located in Cincinnati. He will be in charge at the Hardesty plant in Dover, Ohio.

E. G. Hibarger has been appointed New England representative for Emery Industries, Inc., Cincinnati. He will make his headquarters in Lowell, Mass. C. W. Sampson, formerly in charge of the New England office, has been transferred to company's Cincinnati home office, where he will assume the duties of technical director for Emery Industries.

Robert L. Beyer has returned to Buffalo, N. Y. after 13 months in Hankow, looking after Spencer, Kellogg & Sons tung oil interests there. Company has in that city, now in Japanese hands, a large stock of tung oil.

To Rebuild Linseed Plant

National Lead Co. will rebuild the Brooklyn, N. Y., linseed oil mill destroyed by fire earlier this year. New plant is to be of fireproof construction, and is to have an annual capacity of about 3,000,000 gals. of linseed oil.

Wight Heads Tung Group

The American Tung Oil Association met last month in Pensacola, Fla., for its annual meeting. J. B. Wight, of Cairo, Ga., was elected president of the Association. He succeeds J. C. Adderly, Pensacola, who was president of the organization since its inception in 1934.

B-W Celebrates Jubilee

Bopf-Whitten Corp., Linden, N. J., celebrated its silver anniversary on Aug. 5. President Arthur P. Bopf, founder of the organization, entertained the staff at a dinner-dance held at the Chanticleer, Milburn, N. J.

Oil Trades Party Sept. 28

Frank G. Campbell, Sun Oil Co., chairman of the golf committee of the New Jersey Oil Trades Association, has arranged a shore dinner for the Association's fall golf outing to be held Thursday, Sept. 28, at Suburban Golf Club, Union, N. J.

Salesmen Schedule Last Meet

The Salesmen's Association of the American Chemical Industry has picked Sept. 19 as the date for the final golf tournament of the year, at Pomonok Country Club, Flushing, L. I. Entertainment committee has made special arrangements for the final gathering and the banquet, at which the yearly championship cup will be awarded, will be supplemented by a floorshow.

Successful August Party

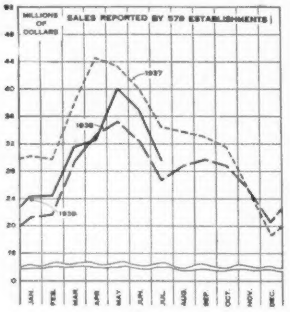
Richard Quortrup, Barrett Co., won the Class A, low net, prize at the Salesmen's Association of the American Chemical Industry tournament held Aug. 15 at the Bonnie Briar Club, Rye, N. Y.

Pigments and Fillers

August Markets Marked By Higher Casein Prices

Spot Stocks Small—Excellent Demand For Carbon Black, Titanium and Zinc Oxide Pigments—War Forces Sharp Increases In Lead Pigments—Spot Stocks of Gums Small—

A STEADY demand for raw paint materials was reported in the month just ended. This was particularly true of titanium and zinc pigments. A healthy increase in shipments of carbon black took place. From the price point of view casein held the most interest. Several sharp advances were made and at the month-end 20-30 mesh was quoted in large quantities at 12½c and 80-100 mesh material at 13c. Buying in this item has been exceptionally heavy and stocks are at a low point.



Sales of coatings show increase in first six months. Bureau of Census.

Higher Lead Oxide Prices

Extreme firmness characterized the market for lead pigments. Very early in August quotations on litharge, orange mineral, and the various grades of red lead were advanced and buyers covered in a major way. When the metal soared in common with other commodities at the outbreak of the war in Europe producers of the pigments were forced to add still another price revision effective on Sept. 5. In the Metropolitan area common powdered litharge was quoted at 7¾c; American orange mineral at 11¼c; and dry red lead at 8¾c. So far the other important paint pigments have not been advanced in price, but consumers and producers alike now anticipate rising prices. Purchasing policies in most instances have been completely reversed and consumers are hastily trying to assemble sizable inventories not only of pigments but of most raw paint materials, many of which are imported items.

Red Vermilion Soars

English vermilion exhibited considerable price gyrations in the last 30 days. Early in the month quotations were reduced when quicksilver declined. When the crisis in Europe became acute, this trend was quickly reversed. At the month-end the item was held at $1.62 per lb. and, when on Sept. 5 the metal jumped $17 per flask to $110, producers of the product raised their quotations further to a basis of $2 per lb.

On the downward side of the market

Important Price Changes

	Aug. 31	July 31
ADVANCED		
Casein, 20-30 mesh	$0.12½	$0.11
80-100 mesh	.13	.11½
Litharge	.066	.0635
Orange mineral	.10½	.10¼
Red lead, 95%	.076	.0735
97%	.0785	.076
98%	.0810	.0785
Vermilion, quicksilver*	2.00	1.59
DECLINED		
Aluminum paste,		
standard	$0.40	$0.43
extra fine lining	.63	.65
ink	.73	.75
powder	.40	.42

* Sept. 5.

the only price revisions of importance were made in several grades of aluminum paste and powder. These changes were reported in the first week of August. The standard grade of paste was reduced 3c to a basis of 40c. Standard varnish powder was reduced 2c to a level of 40c in 300-lb. drums.

Considerable uncertainty has developed in the markets for natural varnish gums and imported earth colors. Importers are finding it extremely difficult to negotiate for replacement of existing stocks and even where it is possible to buy at least momentarily it is difficult to arrange for prompt shipment.

Paint Makers Uncertain

Paint manufacturers are somewhat uncertain as to what effect the outbreak of war will have on their business. Certain it is that their raw material costs will go higher, unless a sudden and unexpected end of hostilities takes place. Residential construction may decline as it did in the period of the World War. Wages in the building trades may go higher, and there may be a definite decline in public construction. On the other hand, demand for industrial coatings is likely to expand rapidly.

Coatings Sales Up 9%

Sales of paint, varnish, lacquer, and fillers amounted to $30,758,617 (680 establishments) in July. However, June sales were about 21% better, their value being estimated at $38,504,857. Paint sales during July of '38, however, were about 9% less, amounting to $27,946,084. In the 6 months ended June 30, '39, paint sales were valued at $197,811,902 (680 establishments), showing a 9% gain over the previous like period last year, when $180,965,715 worth was sold.

July trade sales of paint, varnish and lacquer were valued at $17,215,946 (580 establishments), a poor showing when compared with the previous month's $22,341,180. In July of last year, trade sales amounted to $16,368,159 in value. In the first 6 months of this year, trade sales totaled $109,939,167, making a better showing than in the January-June period of '38, when $105,742,308 worth was sold.

Industrial sales in July were valued at $10,713,443, as compared with June's $12,585,957 and with $8,806,128 in July, '38. Six-month totals of industrial sales during the first 6 months of this year, and of '38, show that a substantial improvement was made during the first half of this year. Sales totaled in value $69,409,601 in the first 6 months of '39, representing a gain of about 22% over the like '38 period, when they amounted to $56,934,501.

Sharp Rise in Construction

The dollar volume of total construction contracts awarded in the 37 Eastern states during the first seven months of 1939 amounted to $1,999,247,000, which is 30% ahead of the same period last year according to statistics compiled by the F. W. Dodge Corp.

Non-Residential building, with a valuation of $88,501,000, for July, 1939, has shown a 22% increase over July of last year which is better than the 19% increase that existed at the end of the first half. Included in this non-residential figure for July is $17,404,000 for manufacturing buildings, which is 10% ahead of June this year and 80% above July of '38.

The residential contracts awarded for July, while $2,566,000 or 2% below June, are 25% ahead of July last year.

New Coast Paint Maker

R. W. Ferrell will shortly begin the manufacture of paints in his new San Diego (Calif.) plant. He was formerly in charge of Montgomery Ward's paint manufacturing division and, since 1937, was with Seidlitz Varnish Co., Kansas City. Ferrell Paint Co. is the new firm's name.

Now a Paint Consultant

Melville O. Parks, formerly technical director of Martin Varnish Co., Chicago, has opened a consulting office in that city. He is well known in the industrial finishes field, and the inventor of several coating processes and specialty formulas.

"Silicosis Prevention" Booklet

"Silicosis Prevention—Dust Control in Foundries" is the title of a new booklet published by Labor Standards Division, U. S. Dept. of Labor. The 25-page manual presents briefly, with the aid of photographs and diagrams, suggested operating practices that will aid in reducing foundry workers' exposure to silica dust. Copies may be had from the Superintendent of Documents, Washington, D. C., at 10c each.

Prices Current

Heavy Chemicals, Coal-tar Products, Dye-and-Tanstuffs, Colors and Pigments, Fillers and Sizes, Fertilizer and Insecticide Materials, Petroleum Solvents and Chemicals, Naval Stores, Fats and Oils, etc.

Chemical prices quoted are of American manufacturers for spot New York, immediate shipment, unless otherwise specified. Products sold f. o. b. works are specified as such. Import chemicals are so designated. Resale stocks when a market factor are quoted in addition to maker's prices and indicated "second hands."

Oils are quoted spot New York, ex-dock. Quotations f. o. b. mills, or for spot goods at the Pacific Coast are so designated.

Raw materials are quoted New York, f. o. b., or ex-dock. Materials sold f. o. b. works or delivered are so designated.

The current range is not "bid and asked," but are prices from different sellers, based on varying grades or quantities or both. Containers named are the original packages most commonly used.

Purchasing Power of the Dollar: 1926 Average—$1.00 - 1937 Average $1.10 - Jan. 1939 $1.25 - August 1939 $1.28

	Current Market		1939 Low	1939 High	1938 Low	1938 High
Acetaldehyde, drs. c-l, wks lb	...	.10	.10	.14	.	.14
Acetaldol, 95%, 50 gal drs wks lb.	.21	.25	.21	.25	.21	.25
Acetamide, tech, lcl, kgs lb.	.28	.50	.28	.50	.32	.60
Acetanilid, tech, 150 lb bbls lb.	...	.22	.22	.29	.29	.32
Acetic Anhydride, drs, f.o.b. wks, frt all'd lb.	.10½	.11	.10½	.11	.10½	.11
Acetin, tech, drs. lb.	...	.33	...	.33	...	.33
Acetone, tks, f.o.b. wks, frt all'd lb	.04¼	.05	.04¼	.05	...	.04¾
drs, c-l, f.o.b. wks, frt all'd lb	.05¾	.06	.05¾	.06	...	.05¾
Acetyl chloride, 100 lb cbys lb	.55	.68	.55	.68	.55	.68
ACIDS						
Abietic, kgs, bbls lb	.08¾	.09	.08¾	.09	.08¾	.10
Acetic, 28%, 400 lb bbls, c-l, wks 100 lbs	...	2.23	...	2.23	...	2.23
glacial, bbls, c-l, wks 100 lbs.	...	7.62	...	7.62	...	7.62
glacial, USP bbls, c-l, wks. 100 lbs.	...	10.25	...	10.25	...	10.25
Acetylsalicylic, USP, 225 lb bbls lb.	...	.40	.40	.50	.50	.60
Adipic, kgs, bbls lb.	...	.72	...	.72	...	.72
Anthranilic, ref'd, bbls lb.	1.15	1.20	1.15	1.20	1.15	1.20
tech bbls lb.	...	.75	...	.75	...	.75
Ascorbic, bot oz.	2.75	3.00	2.75	3.25	...	...
Battery, cbys, wks 100 lbs.	1.60	2.55	1.60	2.55	1.60	2.55
Benzoic tech, 100 lb kgs lb.	.43	.47	.43	.47	.43	.47
USP, 100 lb kgs lb.	.54	.59	.54	.59	.54	.59
Boric, tech, gran, 80 tons, bgs, delv ton *a*	...	96.00	...	96.00	95.00	96.00
Broenner's, bbls lb.	...	1.11	...	1.11	...	1.11
Butyric, edible, c-l, wks, cbys lb.	1.20	1.30	1.20	1.30	1.20	1.30
synthetic, c-l, drs, wks lb.	...	.22	...	.22	...	.22
wks, lcl lb.	...	.23	...	.23	...	.23
tks, wks lb.	...	.21	...	.21	...	.21
Camphoric, drs lb.	5.50	5.70	5.50	5.70	5.50	5.70
Caproic, normal, drs. lb.	...	.35	...	.35	...	...
Chicago, bbls lb.	...	2.10	...	2.10	...	2.10
Chlorosulfonic, 1500 lb drs, wks lb.	.03½	.05	.03½	.05	.03½	.05
Chromic, 99¼%, drs, delv lb.	.15¼	.17¼	.15¼	.17¼	.15¼	.17¼
Citric, USP, crys, 230 lb bbls. lb. *b*	.20	.21½	.20	.22½	.22	.25
anhyd, gran, bbls lb. *b*	...	.23	.23	.25	.25½	.26½
Cleve's, 250 lb bbls lb.	...	.57	...	.57	.50	.57
Cresylic, 99%, straw, HB, drs, wks, frt equal gal.	.49	.50	.49	.64	.63	.91
99%, straw, LB, drs, wks, frt equal gal.	.55	.56	.55	.71	.69	.94
resin grade, drs, wks, frt equal lb.	.08¼	.09¼	.08¼	.09½	.09	.11¼
Crotonic, bbls, delv lb.	.21	.50	.21	.50	.21	1.00
Formic, tech, 140 lb drs lb.	.10½	.11½	.10½	.11½	.10½	.11½
Fumaric, bbls lb.	...	.75	...	.75	.60	.75
Fuming, see Sulfuric (Oleum)						
Gallic, tech, bbls lb.	.70	.73	.70	.73	.70	.79
USP, bbls lb.	.77	.81	.77	.81	.77	.91
Gamma, 225 lb bbls, wks lb.	...	.85	...	.85	...	.85
H, 225 lb bbls, wks lb.	.50	.55	.50	.55	.50	.55
Hydriodic, USP, 47% lb.	...	2.30	...	2.30	2.20	2.30
Hydrobromic, 34% conct 155 lb cbys, wks lb.	.42	.44	.42	.44	.42	.44
Hydrochloric, see muriatic						
Hydrocyanic, cyl, wks lb.	.80	1.30	.80	1.30	.80	1.30
Hydrofluoric, 30%, 400 lb bbls, wks lb.	.07	.07½	.07	.07½	.07	.07½
Hydrofluosilicic, 35%, 400 bbls, wks lb.	.09	.09½	.09	.09½	.09	.15
Lactic, 22%, dark, 500 lb bbls lb.	.02½	.02¾	.02½	.02¾	.02½	.02¾
22%, light ref'd, bbls lb.	.03½	.03¾	.03½	.03¾	.03½	.03¾
44%, light, 500 lb bbls lb.	.05½	.05¾	.05½	.05¾	.05½	.05¾
44%, dark, 500 lb bbls lb.	.06½	.06¾	.06½	.06¾	.06½	.06¾
50%, water white, 500 lb bbls lb.	.10½	.11½	.10½	.11½	.10½	.11½
USP X, 85%, cbys lb.	.42	.45	.42	.45	.42	.45
Lauric, drs. lb.	11¾	.12¼	.11¾	.12¼	.08½	.12¼
Laurent's, 250 lb bbls lb.	.45	.46	.45	.46	.45	.46
Levulinic, 5 lb bot wks lb.	...	2.00	...	2.00	...	2.00
Linoleic, bbls lb.	...	.20	...	.20	...	.20
Maleic, powd, kgs lb.	.30	.40	.30	.40	.30	.40
Malic, powd, kgs lb.	.45	.60	.45	.60	.45	.60
Metanillic, 250 lb bbls lb.	.60	.65	.60	.65	.60	.65
Mixed, tks, wks N unit	.06½	.07¼	.06½	.07¼	.06½	.07¼
S unit	.008	.009	.008	.009	.008	.009
Monochloracetic, tech, bbls lb.	.16	.18	.16	.18	.16	.18
Monosulfonic, bbls lb.	1.50	1.60	1.50	1.60	1.50	1.60

a Powdered boric acid $5 a ton higher in each case; USP $15 higher; *b* Powdered citric is ½c higher; kegs are in each case ½c higher than bbls.; *y* Price given is per gal.

	Current Market		1939 Low	1939 High	1938 Low	1938 High
Muriatic, 18°, 120 lb cbys, c-l, wks 100 lb.	...	1.50	...	1.50	...	1.50
tks, wks 100 lb.	...	1.00	...	1.00	...	1.00
20°, cbys, c-l, wks 100 lb.	...	1.75	...	1.75	...	1.75
tks, wks 100 lb.	...	1.10	...	1.10	...	1.10
22°, c-l, cbys, wks 100 lb.	...	2.25	...	2.25	...	2.25
tks, wks 100 lb.	...	1.60	...	1.60	...	1.60
CP, cbys lb.	.06½	.07⅛	.06½	.07⅛	.06½	.07⅛
N & W, 250 lb bbls lb.	.85	.87	.85	.87	.85	.87
Naphthenic, 240-280 s.v., drs lb.	.10	.13	.10	.13	.10	.13
Sludges, drs lb.	...	.05	...	.05	...	.05
Naphthionic, tech, 250 lb bbls lb.	.60	.65	.60	.65	.60	.65
Nitric, 36°, 135 lb cbys, c-l, wks 100 lb. *c*	...	5.00	...	5.00	...	5.00
38°, c-l, cbys, wks 100 lb. *c*	...	5.50	...	5.50	...	5.50
40°, cbys, c-l, wks 100 lb. *c*	...	6.00	...	6.00	...	6.00
42°, c-l, cbys, wks 100 lb. *c*	...	6.50	...	6.50	...	6.50
CP, cbys, delv lb.	.11½	.12½	.11½	.12½	.11½	.12½
Oxalic, 300 lb bbls, wks, or N Y lb.	.10¾	.12	.10¾	.12	.10¾	.12
Phosphoric, 85%, USP, cbys lb.	.12	.14	.12	.14	.12	.14
50%, acid, c-l, drs, wks lb.	.06	.08	.06	.08	.06	.08
75%, acid, c-l, drs, wks lb.	...	.07½	...	.07½	.07½	.10½
Picramic, 300 lb bbls, wks lb.	.65	.70	.65	.70	.65	.70
Picric, kgs, wks lb.	.35	.40	.35	.40	.35	.40
Propionic, 98% wks, drs lb.	...	.22	...	.22	...	.22
80% lb.	.16	.17½	.16	.17½	.16	.17½
Pyrogallic, tech, lump, pwd, bbls lb.	...	1.05	...	1.05	...	1.05
cryst, USP lb.	1.45	1.63	1.45	1.63	1.45	1.63
Ricinoleic, bbls lb.	...	.35	...	.35	.35	.38
tech, bbls lb.	...	.13	...	.13	...	.13
Salicylic, tech, 125 lb bbls, wks lb.	...	.33	...	.33	...	.33
USP, bbls lb.	.35	.40	.35	.40	.35	.45
Sebacic, tech, drs, wks lb.	...	nom.	...	nom.	.37	.41
Succinic, bbls lb.	...	.75	...	.75	...	.75
Sulfanilic, 250 lb bbls, wks lb.	.17	.18	.17	.18	.17	.18
Sulfuric, 60°, tks, wks ton	...	13.00	...	13.00	...	13.00
c-l, cbys, wks 100 lb.	...	1.25	...	1.25	...	1.25
66°, tks, wks ton	...	16.50	...	16.50	...	16.50
c-l, cbys, wks 100 lb.	...	1.50	...	1.50	...	1.50
CP, cbys, wks lb.	.06½	.07½	.06½	.07½	.06½	.07½
Fuming (Oleum) 20% tks, wks ton	...	18.50	...	18.50	...	18.50
Tannic, tech, 300 lb bbls lb.	.40	.47	.40	.47	.40	.47
Tartaric, USP, gran, powd, 300 lb bbls lb.	.27¼	.27¾	.27¼	.27¾	.24¼	.27¾
Tobias, 250 lb bbls lb.	.65	.67	.65	.67	.65	.67
Trichloroacetic bottles lb.	2.00	2.50	2.00	2.50	2.00	2.50
kgs lb.	...	1.75	...	1.75	...	1.75
Tungstic, tech, bbls lb.	1.70	1.80	1.70	1.80	1.65	2.00
Vanadic, drs, wks lb.	1.10	1.20	1.10	1.20	1.10	1.20
Albumen, light flake, 225 lb. bbls lb.	.52	.60	.52	.60	.52	.60
dark, bbls lb.	.13	.18	.13	.18	.11	.18
egg, edible lb.	.58	.62	.58	.78	.77	1.15
vegetable, edible lb.	.74	.78	.74	.78	.74	.78
ALCOHOLS						
Alcohol, Amyl (from Pentane) tks, delv lb.	...	.101	...	.101	.101	.106
c-l, drs, delv lb.	...	.111	...	.111	.111	.116
lcl, drs, delv lb.	...	.121	...	.121	.121	.126
Amyl, secondary, tks, delv lb.	...	.08½	...	.08½	...	.08½
drs, c-l, delv E, of Rockies lb.	...	.09½	...	.09½	...	.09½
Benzyl, cans lb.	.68	1.00	.68	1.00	.68	1.00
Butyl, normal, tks, f.o.b. wks, frt all'd lb. *d*	...	.07	.07	.08½	.08½	.09
c-l, drs, f.o.b. wks, frt all'd lb. *d*	...	.08	.08	.09½	.09½	.10
Butyl, secondary, tks, delv lb. *d*	...	.05½	.05½	.06	...	.06
c-l, drs, delv lb. *d*	...	.06½	.06½	.07	...	.07
Capryl, drs, tech, wks lb.	.	.85	.	.85	...	.85
Cinnamic, bottles lb.	2.00	2.50	2.00	2.50	2.00	2.50
Denatured, CD, 14, 13, c-l, drs, wks gal. *e*	.27½	.31½	.27½	.32	.31	.35
tks, East, wks gal.	.	.21½	.21½	.24	.23	.29
Western schedule, c-l, drs, wks gal. *e*	...	.34½	.34½	.37	.36	.38
Denatured, SD, No. 1, tks,	...	.19½	.19½	.22	.22	.27
c-l, drs, wks gal. *e*	...	.25½	.25½	.28	.28	.33

c Yellow grades 25c per 100 lbs. less in each case; *d* Spot prices are 1c higher; *e* Anhydrous is 5c higher in each case; *f* Pure prices are 1c higher in each case.

ABBREVIATIONS—Anhydrous, anhyd; bags, bgs; barrels, bbls; carboys, cbys; carlots, c-l; less-than-carlots, lcl; drums, drs; kegs, kgs; powdered, powd; refined, ref'd; tanks, tks; works, f.o.b., wks.

Prices Current

	Current Market		1939 Low	1939 High	1938 Low	1938 High
Alcohols (continued):						
Diacetone, pure, c-l, drs, delv ....lb. f	...	.09	.09	.11½	...	.11½
tech, contract, drs, c-l, delv ....lb.	...	.08½	.08½	.10½	...	.10½
Ethyl, 190 proof, molasses, tks ....gal. g	...	4.46	4.46	4.48½	4.04	4.51½
c-l, drs ....gal. g	.	4.49	4.49	4.54½	4.10	4.59½
c-l, bbls ....gal. g		4.53	4.53	4.55½	4.11	4.58½
Furfuryl, tech, 500 lb drs lb.	.25	.35	.25	.35	.25	.35
Hexyl, secondary tks, delv lb.	...	.12	...	.12	...	.12
c-l, drs, delv ....lb.	...	.13	...	.13	...	.13
Normal, drs, wks ....lb.	3.25	3.50	3.25	3.50	3.25	3.50
Isoamyl, prim, cans, wks lb.	...	.32	...	.32	...	.32
drs, lcl, delv ....lb.	...	.27	.	.27	. .	.27
Isobutyl, ref'd, lcl, drs ..lb.	...	.073	.073	.09	.09	.10
c-l, drs ....lb.	...	.068	.068	.08½	.08½	.09½
tks ....lb.	...	.058	.058	.07½	.07½	.08½
Isopropyl, ref'd, 91%, c-l, drs, f.o.b. wks, frt all'd ....lb.	...	.36	...	.36	...	.36
Ref'd 98%, drs, f.o.b. wks, frt all'd ....gal.	...	.41	...	.41	...	.41
Tech 91%, drs, above terms ....gal.	...	.33½	...	.33½	...	.33½
tks, same terms ..gal.	...	.28½	...	.28½	...	.28½
Tech 98%, drs, above terms ....gal.	...	.37½	...	.37½	...	.37½
tks, above terms ..gal.	.	.32½	. .	.32½		.32½
Spec Solvent, tks, wks gal.	.19	.20	.19	.23	.23	.28
Aldehyde ammonia, 100 gal drs ....lb.	.80	.82	.80	.82	.80	.82
Aldehyde Bisulfite, bbls, delv ....lb.	...	.17	...	.17	...	.17
Aldol, 95%, 55 and 110 gal, drs, delv ....lb.	.11	.12	.11	.20	...	.20
Alphanaphthol, crude, 300 lb bbls ....lb.	...	.52	...	.52	...	.52
Alphanaphthylamine, 350 lb bbls ....lb.	.32	.34	.32	.34	.32	.34
Alum, ammonia, lump, c-l, bbls, wks ....100 lb.	3.40	3.65	3.40	3.65	3.40	3.65
delv NY, Phila ...100 lb.	...	3.40	...	3.40	...	3.40
Granular, c-l, bbls wks ....100 lb.	3.15	3.40	3.15	3.40	3.15	3.40
Powd, c-l, bbls, wks 100 lb.	...	3.55	...	3.55	...	3.55
Chrome, bbls ....100 lb.	6.50	6.75	6.50	6.75	6.50	6.75
Potash, lump, c-l, bbls, wks ....100 lb.	3.65	3.90	3.65	3.90	3.65	3.90
Granular, c-l, bbls, wks ....100 lb.	3.40	3.65	3.40	3.65	3.40	3.65
Powd, c-l, bbls, wks 100 lb.	3.80	4.05	3.80	4.05	3.80	4.05
Soda, bbls, wks ....100 lb.	...	3.25	...	3.25	...	3.25
Aluminum metal, c-l, NY 100 lb.	...	20.00	...	20.00	...	20.00
Acetate, 20%, bbls ...lb.	.07½	.09	.07½	.09	.07½	.10
Basic powd, bbls, delv. lb.	.40	.50	.40	.50	.40	.50
Chloride anhyd, 99%, wks lb.	.07	.12	.07	.12	.07	.12
93%, wks ....lb.	.05	.08	.05	.08	.05	.08
Crystals, c-l, drs, wks lb.	.06	.06¼	.06	.06¼	.06	.06¼
Solution, drs, wks ...lb.	.02¾	.03¼	.02¾	.03¼	.02¾	.03¼
Formate, 30% sol bbls, c-l, delv ....lb.	...	.13	...	.13	...	.13
Hydrate, 96%, light, 90 lb bbls, delv ....lb.	.12½	.13½	.11½	.13	.12	.13
heavy, bbls, wks ....lb.	.029	.03½	.029	.03½	.029	.03½
Oleate, drs ....lb.	.16¾	.18½	.16¾	.18½	.16¾	.18½
Palmitate, bbls ....lb.	...	.23	...	.23	...	.23
Resinate, pp., bbls ....lb.	...	.15	...	.15	...	.15
Stearate, 100 lb. bbls ..lb.	.16	.17	.16	.21	.19	.21
Sulfate, com, c-l, bgs, wks ....100 lb.	...	1.15	...	1.15	1.15	1.35
c-l, bbls, wks ....100 lb.	...	1.35	...	1.35	1.35	1.55
Sulfate, iron-free, c-l, bgs, wks, ...100 lb.	...	2.00	...	2.00	...	2.00
c-l, bbls, wks ....100 lb.	...	2.20	...	2.20	...	2.20
Aminoazobenzene, 110 lb kgs lb.	...	1.15	...	1.15	...	1.15
Ammonia anhyd fert com, tks lb.	.04½	.05½	.04½	.05½	.04½	.05½
Ammonia anhyd, 100 lb cyl lb.	.16	.22	.16	.22	.16	.22
26°, 800 lb drs, delv lb.	.02¼	.02½	.02¼	.02½	.02¼	.02½
Aqua 26°, tks, NH ..cont.	...	.04z	...	.04z	...	.05**
tk wagon ....lb.	...	.02	...	.02	...	.02
Ammonium Acetate, kgs ..lb.	.26	.33	.26	.33	.26	.33
Bicarbonate, bbls, f.o.b. wks ....100 lb.	5.15	5.71	5.15	5.71	5.15	5.71
Bifluoride, 300 lb bbls ..lb.	.14½	.16½	.14½	.16½	.14½	.17
carbonate, tech, 500 lb bbls ....lb.	.08	.12	.08	.12	.08	.12
Chloride, White, 100 lb bbls, wks ....100 lb.	4.45	4.90	4.45	4.90	4.45	4.90
Gray, 250 lb bbls, wks ....100 lb.	5.50	6.25	5.50	6.25	5.50	6.25
Lump, 500 lb cks spot lb.	.10½	.11	.10½	11.	.10½	.11
Lactate, 500 lb bbls ...lb.	.15	.16	.15	.16	.15	.16
Laurate, bbls ....lb.	...	.23	...	.23	...	.23
Linoleate, 80% anhyd, bbls ....lb.	...	.15	...	.15	...	.15
Naphthenate, bbls ....lb.	...	.17	...	.17	...	.17
Nitrate, tech, cks ....lb.	.036	.0385	.036	.0405	.038	.0405
Oleate, drs ....lb.	...	.15	...	.15	...	.15
Oxalate, neut, cryst, powd, bbls ....lb.	.19	.20	.19	.20	.19	.22½
Perchlorate, kgs ....lb.	...	.16	...	.16	...	.16
Persulfate, 112 lb kgs ..lb.	.21	.24	.21	.24	.21	.24
Phosphate, dibasic tech, powd, 325 lb bbls ...lb.	.07½	.10	.07½	.10	.07½	.10
Ricinoleate, bbls ....lb.	...	.15	...	.15	...	.15
Stearate, anhyd, bbls...lb.	...	.23	.23	.24	...	.24
Paste, bbls ....lb.	...	.08	.07½	.08	...	.07½

g Grain alcohol 25c a gal. higher in each case. **On a delv. basis.
z On a f.o.b. wks. basis.

	Current Market		1939 Low	1939 High	1938 Low	1938 High
Ammonium (continued):						
Sulfate, dom, f.o.b., bulk ton	...	...	27.00	28.00	27.00	28.50
Sulfocyanide, pure, kgs .lb.	...	.55	...	.55	...	.55
Amyl Acetate (from pentane) tks, delv ....lb.	...	.095	.095	.10	.10	.11½
c-l, drs, delv ....lb.	...	.105	.105	.11	...	...
lcl, drs, delv ....lb.	...	.115	.115	.112	...	...
tech, drs, delv ....lb.	...	.11½	.10½	.11½	.11	.10½
Secondary, tks, delv. .lb.	...	.08½	...	.08½	...	.08½
c-l, drs, delv ....lb.	...	.09½	...	.09½	...	.09½
tks, delv ....lb.	...	.08½	...	.08½	...	.08½
Chloride, norm, drs, wks lb.	.56	.68	.56	.68	.56	.68
mixed, drs, wks ....lb.	.0565	.0665	.0565	.077	.07	.077
tks, wks ....lb.	...	.0465	.0465	.06	...	.06
Mercaptan, drs, wks ...lb.	...	1.10	...	1.10	...	1.10
Oleate, lcl, wks, drs ...lb.	...	.25	...	.25	...	.25
Stearate, lcl, wks, drs ..lb.	...	.26	...	.26	...	.26
Amylene, drs, wks ....lb.	.102	.11	.102	.11	.102	.11
tks, wks ....lb.	...	.09	...	.09	...	.09
Aniline Oil, 960 lb drs and tks ....lb.	.14½	.17½	.14½	.17½	.14½	.17½
Annatto fine ....lb.	.34	.37	.34	.37	.34	.37
Anthracene, 80% ....lb.	...	.55	.55	.75	...	.75
Anthraquinone, sublimed, 125 lb bbls ....lb.	...	.65	...	.65	...	.65
Antimony metal slabs, ton lots ....lb.	...	.12	.11¼	.12	.10¾	.14
Butter of, see Chloride.						
Chloride, soln cbys ....lb.	...	.17	...	.17	...	.17
Needle, powd, bbls ....lb.	.12	.13	.12	.14	.12½	.16
Oxide, 500 lb bbls ....lb.	.10	.10½	.10	.12½	.11½	.16½
Salt, 63% to 65%, tins lb.	.25¾	.27	.25¾	.27	.26	.27
Sulfuret, golden, bbls ..lb.	.22	.23	.22	.23	.22	.23
Archil, conc, 600 lb bbls .lb.	.21	.27	.21	.27	.21	.27
Double, 600 lb bbls ....lb.	.18	.20	.18	.20	.18	.20
Aroclors, wks ....lb.	.18	.30	.18	.30	.18	.30
Arrowroot, bbls ....lb.	.08½	.09	.08½	.09	.08½	.09
Arsenic, Metal ....lb.	.40	.41	.40	.41	.40	.44
Red, 224 lb cs kgs ...lb.	...	.15¾	...	.15¾	...	.15¾
White, 112 lb kgs ....lb.	.03	.03¾	.03	.03¾	.03	.04
B						
Barium Carbonate precip, 200 lb bgs, wks ....ton	52.50	62.50	52.50	62.50	52.50	62.50
Nat (witherite) 90% gr, c-l, wks, bgs ....ton	41.00	43.00	41.00	43.00	41.00	44.00
Chlorate, 112 lb kgs, NY lb.	.16½	.17½	.16½	.17½	.16½	.17½
Chloride, 600 lb bbls, delv, zone 1 ....ton	77.00	92.00	77.00	92.00	77.00	.92.00
Dioxide, 88%, 690 lb drs lb.	.11	.12	.11	.12	.11	.12
Hydrate, 500 lb bbls ...lb.	.04½	.05	.04½	.05½	.04¾	.05½
Nitrate, bbls ....lb.	.06¾	.07¼	.06¾	.07¼	.06¾	.08¼
Barytes, floated, 350 lb bbls c-l, wks ....ton	...	.23.65	...	23.65	...	23.65
Bauxite, bulk, mines ....ton	7.00	10.00	7.00	10.00	7.00	10.00
Bentonite, c-l, 325 mesh, bgs, wks ....ton	...	16.00	...	16.00	...	16.00
200 mesh ....ton	...	11.00	...	11.00	...	11.00
Benzaldehyde, tech, 945 lb. drs, wks ....lb.	.60	.62	.60	.62	.60	.62
Benzene (Benzol), 90%, Ind. 8000 gal tks, ft all'd .gal.	...	.16	...	.16	...	.16
90% c-l, drs ....gal.	...	.21	...	.21	...	.21
Ind pure, tks, frt all'd gal.	...	.16	...	.16	...	.16
Benzidine Base, dry, 250 lb bbls ....lb.	.70	.72	.70	.72	.70	.72
Benzoyl Chloride, 500 lb drs lb.	.40	.45	.40	.45	.40	.45
Benzyl Chloride, 95-97% rfd, drs ....lb.	.30	.40	.30	.40	.30	.40
Tech, drs ....lb.	.25	.26	.25	.26	.25	.26
Beta-Naphthol, 250 lb bbls, wks ....lb.	.23	.24	.23	.24	.23	.24
Naphthylamine, sublimed, 200 lb bbls ....lb.	1.25	1.35	1.25	1.35	1.25	1.35
Tech, 200 lb bbls ....lb.	.51	.52	.51	.52	.51	.52
Bismuth metal ....lb.	1.10	1.15	1.05	1.15	1.00	1.10
Chloride, boxes ....lb.	3.20	3.25	3.20	3.25	3.20	3.25
Hydroxide, boxes ....lb	3.15	3.20	3.15	3.20	3.15	3.20
Oxychloride, boxes ....lb.	...	2.95	...	2.95	...	2.95
Subbenzoate, boxes ....lb.	3.25	3.30	3.25	3.30	3.25	3.30
Subcarbonate, kgs ....lb.	1.43	1.46	1.43	1.56	1.13	1.58
Trioxide, powd, boxes .lb.	...	3.57	...	3.57	...	3.57
Subnitrate, fibre, drs ..lb.	1.23	1.26	1.23	1.36	1.03	1.48
Blanc Fixe, 400 lb bbls, wks ton h	40.00	75.00	40.00	75.00	40.00	75.00
Bleaching Powder, 800 lb drs, c-l, wks, contract 100 lb.	...	2.00	...	2.00	...	2.00
lcl, drs, wks ....lb.	2.25	3.60	2.25	3.60	2.25	3.60
Blood, dried, f.o.b., NY unit	...	2.75	2.50	3.50	2.50	3.25
Chicago, high grade ..unit	...	2.70	2.30	3.35	2.35	3.35
Imported shipt ....unit	...	2.70	2.65	3.00	2.90	3.45
Blues, Bronze Chinese Milori Prussian Soluble ....lb.	.36	.37	.36	.37	.36	.37
Ultramarine,* dry, wks, bbls ....lb.	...	.11	...	.11	...	.11
Regular grade, group 1 lb.	...	.16	...	.16	...	.16
Special, group 1 ....lb.	...	.19	...	.19	...	.19
Pulp, No. 1 ....lb.	...	.27	...	.27	...	.27
Bone, 4½ + 50% raw, Chicago ....ton	...	27.00	27.00	29.00	25.50	30.00
Bone Ash, 100 lb kgs ....lb.	.06	.07	.06	.07	.06	.07
Black, 200 lb bbls ....lb.	.06½	.08¼	.06½	.08¼	.06½	.08¼
Meal, 3% & 50%, imp ton	...	23.50	22.00	24.00	20.50	23.75
Domestic, bgs, Chicago ton	...	26.00	24.00	27.00	16.00	26.00
Borax, tech, gran, 80 ton lots, sacks, delv ....ton i	...	43.00	...	43.00	42.00	43.00
bbls, delv ....ton i	...	53.00	...	53.00	52.00	53.00

h Lowest price is for pulp, highest for high grade precipitated; i Crystals $6 per ton higher; USP, $15 higher in each case; *Freight is equalized in each case with nearest producing point.

Prices Current

	Current Market		1939 Low	1939 High	1938 Low	1938 High
Borax (continued)						
Tech, powd, 80 ton lots, sacks ....ton j	...	47.00	...	47.00	...	47.00
bbls, del ....ton j	...	57.00	...	57.00	...	57.00
Bordeaux Mixture, drs ...lb.	.11	.11½	.11	.11½	.11	.11½
Bromine, cases ....lb.	.30	.43	.30	.43	.30	.43
Bronze, Al, pwd, 300 lb drs lb.	.90½	.92½	.90½	.92½	.90½	.92½
Gold, blk ....lb.	.45	.65	.45	.65	.45	.65
Butanes, com 16-32° group 3 tks ....lb.	.02¼	.03¾	.02¼	.03¾	.02¼	.03¾
Butyl, Acetate, norm drs, frt allowed ....lb.	...	.08	.08	.09½	.09½	.10½
tks, frt allowed ....lb.	...	.07	.07	.08½	.08½	.09
Secondary, tks, frt allowed ....lb.	...	.05½	.05½	.06½	.06½	.07
drs, frt allowed ....lb.	.065	.07	.068	.08	.07½	.08½
Aldehyde, 50 gal drs, wks ....lb.	.15½	.17½	.15½	.17½	.16½	.17½
Carbinol, norm drs, wks lb.	.60	.75	.60	.75	.60	.75
Crotonate, norm, 55 and 110 gal drs, delv ....lb.	...	.35	.35	.75	...	...
Lactate ....lb.	.22½	.23½	.22½	.23½	.22½	.23½
Oleate, drs, frt allowed lb.	...	.25	...	.25	...	.25
Propionate, drs ....lb.	.16½	.17	.16½	.18½	.18	.18½
tks, delv ....lb.	...	.15½	.15½	.17	...	.17
Stearate, 50 gal drs ...lb.	...	.26	...	.26	...	.26
Tartrate, drs ....lb.	.55	.60	.55	.60	.55	.60
Butyraldehyde, drs, lcl, wks lb.	...	.35½	...	.35½	...	.35½
C						
Cadmium Metal ....lb.	.55	.60	.50	.85	.85	1.60
Sulfide, orange, boxes lb.	.75	.85	.75	.90	.80	1.60
Calcium, Acetate, 150 lb bgs c-l, delv ....100 lb.	...	1.65	...	1.65	...	1.65
Arsenate, c-l, E. of Rockies, dealers, drs ....lb.	.06¾	.07¼	.06¾	.07¼	.06¾	.07¼
Carbide, drs ....lb.	.05	.06	.05	.06	.05	.06
Carbonate, tech, 100 lb bgs c-l ....lb.	...	1.00	...	1.00	...	1.00
Chloride, flake, 375 lb drs, burlap bgs, c-l, delv ..ton	...	22.00	...	22.00	22.00	23.50
paper bgs, c-l, delv ..ton	23.00	36.00	23.00	36.00	23.00	36.00
Solid, 650 lb drs, c-l, delv ....ton	...	20.00	...	20.00	20.00	21.50
Ferrocyanide, 350 lb bbls wks ....lb.	...	.17	...	.17	...	.17
Gluconate, Pharm, 125 lb bbls ....lb.	.50	.57	.50	.57	.50	.57
Levulinate, less than 25 bbl lots, wks ....lb.	...	3.00	...	3.00	...	3.00
Nitrate, 100 lb bgs ....ton	...	28.00	...	28.00	...	28.00
Palmitate, bbls ....lb.	.22	.23	.22	.23	.22	.23
Phosphate, tribasic, tech, 450 lb bbls ....lb.	.06½	.07½	.06½	.07½	.06½	.07½
Resinate, precip, bbls ..lb.	.13	.14	.13	.14	.13	.14
Stearate, 100 lb bbls ..lb.	.19	.21	.19	.21	.19	.21
Camphor, slabs ....lb.	.46	.48½	.46	.52½	.52	.56
Powder ....lb.	.45	.47	.45	.52½	.52	.56
Carbon Bisulfide, 500 lb drs lb.	.05	.05¾	.05	.05¾	.05	.05¾
Black, c-l, bgs, delv, price varying with zone† ..lb.	.02¾	.03¾	.02¾	.03¾	.027	.0380
lcl, bgs, f.o.b. whse ..lb.	...	.06¼	...	.06¼	.05¾	.06¼
cartons, f.o.b. whse ..lb.	...	.06¼	...	.06¼	...	.06¼
cases, f.o.b. whse ..lb.	...	.07	...	.07	...	.07
Decolorizing, drs, c-l ...lb.	.08	.15	.08	.15	.08	.15
Dioxide, Liq 20-25 lb cyl lb.	.06	.08	.06	.08	.06	.08
Tetrachloride, 55 or 110 gal drs, c-l, delv ...lb.	.05	.05½	.05	.05½	.05	.06
Casein, Standard, Dom, grd lb.	.12½	.16	.07	.16	.06½	.13½
80-100 mesh, c-l, bgs ..lb.	.13	.16	.07½	.16	.07	.14
Castor Pomace, 5½ NH_3, c-l, bgs, wks ....ton	...	16.50	16.50	18.50	18.50	21.00
Imported, ship, bgs ....ton	...	18.00	18.00	20.00	20.00	21.00
Celluloid, Scraps, ivory cs lb.	.12	.15	.12	.15	.12	.15
Transparent, cs ....lb.	...	.20	...	.20	...	.20
Cellulose, Acetate, 50 lb kgs ....lb.	...	.35	.35	.36	.36	.40
Chalk, dropped, 175 lb bbls lb.	.02¾	.03¾	.02¾	.03¾	.02¾	.03¾
Precip, heavy, 560 lb cks lb.	.02¾	.03¼	.02¾	.03¼	.02¼	.04
Light, 250 lb cks ....lb.	.03¼	.04	.03¼	.04	.03¼	.04
Charcoal, Hardwood, lump, blk, wks ....bu.	...	.15	...	.15	...	.15
Softwood, bgs, delv* ..ton	25.00	36.00	23.00	36.00	23.00	34.00
Willow, powd, 100 lb bbls, wks ....lb.	.06	.07	.06	.07	.06	.07
Chestnut, clarified, tks, wks lb.	...	.01⅝	...	.01⅝	.01⅝	.02125
25%, bbls, wks ....lb.	...	.02	...	.02	.02	.0225
Pwd, 60%, 100 lb bgs, wks ....lb.	...	.04½	...	.04½	.04½	.04⅞
China Clay, c-l, blk mines ton	...	7.60	7.00	7.60	...	7.00
Imported, lump, blk ...ton	22.00	25.00	22.00	25.00	22.00	25.00
Chlorine, cyls, lcl, wks, contract ....lb.	.07½	.08½	.07½	.08½	.07½	.08½
cyls, c-l, contract ...lb. j	...	.05¾	.05¾	.05½	...	.05½
Liq, tk, wks, contract 100 lb.	...	1.75	1.75	2.00	2.00	2.15
Multi, c-l, cyls, wks, cont ....lb.	...	1.90	1.90	2.15	2.30	2.55
Chloroacetophenone, tins, wks ....lb.	3.00	3.50	3.00	3.50	3.00	3.50
Chlorobenzene, Mono, 100 lb drs, lcl, wks ....lb.	.06	.07½	.06	.07½	.06	.07½
Chloroform, tech, 1000 lb drs ....lb.	.20	.21	.20	.21	.20	.21
USP, 25 lb tins ....lb.	.30	.31	.30	.31	.30	.31
Chloropicrin, comml cyls ..lb.	...	.80	...	.80	...	.80
Chrome, Green, CP ....lb.	.21	.25	.21	.25	.21	.25
Yellow ....lb.	.14½	.15½	.14½	.15½	.14½	.15½

j A delivered price; * Depends upon point of delivery; † New bulk price, tank cars ¼c per lb. less than bags in each zone.

	Current Market		1939 Low	1939 High	1938 Low	1938 High
Chromium Acetate, 8% Chrome, bbls ....lb.	.05	.08	.05	.08	.05	.08
Fluoride, powd, 400 lb bbl ....lb.	.27	.28	.27	.28	.27	.28
Coal tar, bbls ....bbl.	7.50	8.00	7.50	8.00	7.50	8.00
Cobalt Acetate, bbls ....lb.	.65	.67	.65	.67	.65	.68
Carbonate tech, bbls ...lb.	1.25	1.60	1.25	1.63	...	1.63
Hydrate, bbls ....lb.	...	1.78	...	1.78	1.36	1.78
Linoleate, solid, bbls...lb.	...	.33	...	.33	...	.33
paste, 6%, drs ....lb.	...	.31	...	.31	...	.31
Oxide, black, bgs ....lb.	...	1.67	...	1.67	...	1.67
Resinate, fused, bbls..lb.	...	.13½	...	.13½	...	.13½
Precipitated, bbls ...lb.	...	.34	...	.34	...	.34
Cochineal, gray or bk bgs lb.	.35	.38	.35	.38	.35	.38
Teneriffe silver, bgs ...lb.	.36	.39	.36	.39	.36	.39
Copper, metal, electrol 100 lb.	...	10.50	10.00	11.25	9.00	11.25
Acetate, normal, bbls, wks ....lb.	.21	.23	.21	.23	.21	.23
Carbonate, 400 lb bbls..lb.	.10½	.11½	.10½	.11½	.10¼	.11½
52-54% bbls ....lb.	.14½	.15½	.14½	.15½	.1340	.16¾
Chloride, 250 lb bbls...lb.	.12½	.13½	.12½	.14	.12½	.17
Cyanide, 100 lb drs ...lb.	...	.34	...	.34	.34	.38
Oleate, precip, bbls ...lb.	...	.20	...	.20	...	.20
Oxide, black, bbls, wks lb.	.15	.16	.15	.17¾	.13½	.17¾
red 100 lb bbls ....lb.	.15¾	.16¾	.15¾	.17¾	.15	.19775
Sub-acetate verdigris, 400 lb bbls ....lb.	.18	.19	.18	.19	.18	.19
Sulfate, bbls, c-l, wks 100 lb.	...	4.25	4.10	4.50	4.00	4.50
Copperas, crys and sugar bulk c-l, wks ....ton	...	14.00	...	14.00	12.00	14.00
Corn Sugar, tanners, bbls 100 lb.	...	3.04	2.89	3.19	2.95	3.30
Corn Syrup, 42°, bbls 100 lb.	...	3.07	2.92	3.12	2.89	3.16
43°, bbls ....100 lb.	...	3.12	2.97	3.17	2.94	3.21
Cotton, Soluble, wet, 100 lb bbls ....lb.	.40	.42	.40	.42	.40	.42
Cream Tartar, powd & gran 300 lb bbls ....lb.	.22¼	.22¾	.22¼	.23¼	.19¾	.23¼
Creosote, USP, 42 lb cbys lb.	.45	.47	.45	.47	.45	.47
Oil, Grade 1 tks ....gal.	.13½	.14	.13½	.14	.13½	.14
Grade 2 ....gal.	.122	.132	.122	.132	.122	.132
Cresol, USP, drs ....lb.	.09½	.10	.09½	.10½	.10	.12½
Crotonaldehyde, 97%, 55 and 110 gal drs, wks ...lb.	.11	.12	.11	.22*	.22*	.30*
Cutch, Philippine, 100 lb bale lb.	...	.04	.04	.04½	.04	.06
Cyanamid, pulv, bags c-l, frt all'w'd, nitrogen basis, unit	...	1.27½	...	...	...	...
D						
Derris root 5% rotenone, bbls ....lb.	.24	.30	.24	.30	.34	.43
Dextrin, corn, 140 lb bgs f.o.b., Chicago ...100 lb.	3.45	3.65	3.30	3.70	3.30	3.75
British Gum, bgs ...100 lb.	3.70	3.80	3.55	3.95	3.55	4.00
Potato, Yellow, 220 lb bgs lb.	.07	.07¾	.07	.08¾	.07¼	.08¾
White, 220 lb bgs, lcl lb.	.08	.09	.08	.09	.08	.09
Tapioca, 200 bgs, lcl ...lb.		.0715	...	.0715	.0715	.08
White, 140 lb bgs ..100 lb.	3.40	3.60	3.25	3.60	3.30	3.70
Diamylamine, c-l, drs, wks lb.	...	.47	...	.47	.47	.75
l.c.l. drs, wks ....lb.	.48	.50	...	...	...	...
tks, wks ....lb.	...	.45	...	...	...	...
Diamylene, drs, wks ....lb.	.095	.102	.095	.102	.095	.102
tks, wks ....lb.	...	.08½	...	.08½	...	.08½
Diamylether, wks, drs ...lb.	.085	.092	.085	.092	.085	.092
tks, wks ....lb.	...	.075	...	.075	...	.075
Oxalate, lcl, drs, wks..lb.	...	.30	...	.30	...	.30
Diamylphthalate, drs, wks lb.	.21	.21½	.19	.21	.19	.21
Diamyl Sulfide, drs, wks lb.	...	1.10	...	1.10	...	1.10
Diatomaceous Earth, see Kieselguhr.						
Dibutoxy Ethyl Phthalate, drs, wks ....lb.	...	.35	...	.35	...	.35
Dibutylamine, lcl, drs, wks lb.	.51	.53	.51	.55	...	.55
c.l. drs, wks ....lb.	...	.50	...	...	...	...
tks, wks ....lb.	...	.48	...	...	...	...
Dibutyl Ether, drs, wks, lcl lb.	.24½	.25	.24½	.25	.25	.30
Dibutylphthalate, drs, wks, frt all'd ....lb.	.19	.19½	.19	.19½	.19	.21
Dibutyltartrate, 50 gal drs lb.	...	.50	.45	.54	.45	.54
Dichlorethylene, drs ....lb.	...	.25	...	.25	...	.25
Dichloroethylether, 50 gal drs, wks ....lb.	.15	.16	.15	.16	.15	.16
tks, wks ....lb.	...	.14	...	.14	...	.14
Dichloromethane, drs, wks lb.	...	.23	...	.23	...	.23
Dichloropentanes, drs, wks lb.	no prices		no prices		...	...
tks, wks ....lb.	no prices		no prices		...	...
Diethanolamine, tks, wks..lb.	...	.23	...	.23	...	.23
Diethylamine, 400 lb drs..lb.	2.75	3.00	2.75	3.00	2.75	3.00
Diethylaniline, 850 lb drs lb.	.40	.52	.40	.52	.40	.50
Diethyl Carbinol, drs ....lb.	.60	.75	.60	.75	.60	.75
Diethylcarbonate, com drs lb.	.31¾	.35	.31¾	.35	.31¾	.35
Diethylorthotoluidin, drs ..lb.	.64	.67	.64	.67	.64	.67
Diethylphthalate, 1000 lb drs lb.	.19	.19½	.19	.19½	.19	.19½
Diethylsulfate, tech, drs, wks, lcl ....lb.	.13	.14	.13	.14	.13	.14
Diethyleneglycol, drs ....lb.	.16	.17	.16	.17	.16	.17
Mono ethyl ethers, drs..lb.	.15	.16	.15	.16	.15	.16
tks, wks ....lb.	...	.14	...	.14	...	.14
Mono butyl ether, drs..lb.	.23	.24	.23	.24	.23	.24
tks, wks ....lb.	...	.22	...	.22	...	.22
Diethylene oxide, 50 gal drs, wks ....lb.	.20	.24	.20	.24	.20	.24
Diglycol Laurate, bbls ...lb.	.16	.17	.16	.23	...	.27½
Oleate, bbls ....lb.	...	.13	.13	.20	...	.21
Stearate, bbls ....lb.	...	.20	.20	.28	...	.27½
Dimethylamine, 400 lb drs, pure 25 & 40% sol 100% basis ....lb.	...	1.00	...	1.00	...	1.00
Dimethylaniline, 340 lb drs lb.	.23	.24	.23	.24	.23	.27
Dimethyl Ethyl Carbinol, drs lb.	.60	.75	.60	.75	.60	.75

k Higher price is for purified material; * These prices were on a delivered basis.

Prices

	Current Market		1939 Low	1939 High	1938 Low	1938 High
Dimethyl phthalate, drs, wks, frt allowed ....lb.	...	.19	...	.19	...	.19
Dimethylsulfate, 100 lb drs lb.	.45	.50	.45	.50	.45	.50
Dinitrobenzene, 400 lb bbls lb. *k*	.18	.19	.16	.19	.16	.19
Dinitrochlorobenzene, 400 lb bbls ....lb.	...	.14	.13½	.14	.13½	.14
Dinitronaphthalene, 350 lb bbls ....lb.	.35	.38	.35	.38	.35	.38
Dinitrophenol, 350 lb bbls lb.	.22	.23	.22	.24	.23	.24
Dinitrotoluene, 300 lb bbls lb.	...	.15½	...	.15½	...	.15½
Diphenyl, bbls ....lb.	.15	.25	.15	.25	.15	.25
Diphenylamine ....lb.	.31	.32	.32	.32	.31	.32
Diphenylguanidine, 100 lb drs ....lb.	.35	.37	.31	.37	.31	.32
Dip Oil, see Tar Acid Oil.						
Divi Divi pods, bgs shipmt ton	...	nom.	...	nom.	...	nom.
Extract ....lb.	.05¾	.06¾	.05¾	.06¾	.05	.06¾
E						
Egg Yolk, dom., 200 lb cases lb.	.59	.62	.59	.69	.60	.69
Epsom Salt, tech, 300 lb bbls c-l, NY ....100 lb.	1.90	2.10	1.90	2.10	1.90	2.10
USP, c-l, bbls .....100 lb.	...	2.10	...	2.10	...	2.10
Ether, USP anaesthesia 55 lb drs ....lb.	.22	.23	.22	.23	.22	.23
(Conc) ....lb.	.09	.10	.09	.10	.09	.10
Isopropyl 50 gal drs ...lb.	.07	.08	.07	.08	.07	.08
tks, frt allowed ......lb.	...	.06	...	.06	...	.06
Nitrous conc bottles ...lb.	...	.68	...	.68	...	.68
Synthetic, wks, drs ...lb.	.08	.09	.08	.09	.08	.09
Ethyl Acetate, 85% Ester tks, frt all'd ....lb.	...	.051	...	.051	.051	.05½
drs, frt all'd ....lb.	...	.061	...	.061	.061	.06½
99%, tks, frt all'd ...lb.	...	.0585	...	.0585	.0585	.06¾
drs, frt all'd ....lb.	...	.0685	...	.0685	.0685	.07¾
Acetoacetate, 110 gal drs lb.	...	.27½	...	.27½	...	.27½
Benzylaniline, 300 lb drs lb.	.86	.88	.86	.88	.86	.88
Bromide, tech, drs .....lb.	.50	.55	.50	.55	.50	.55
Cellullose, drs, wks, frt all'd ....lb.	.45	.50	.45	.50	.45	1.00
Chloride, 200 lb drs ...lb.	.22	.24	.22	.24	.22	.24
Chlorocarbonate, cbys ..lb.	...	.30	...	.30	...	.30
Crotonate, drs ....lb.	...	.35	.35	.75	1.00	1.25
Formate, drs, frt all'd..lb.	.27	.28	.27	.28	.27	.28
Lactate, drs, wks ......lb.	...	.33	...	.33	...	.33
Oxalate, drs, wks .....lb.	.30	.34	.30	.34	.30	.34
Oxybutyrate, 50 gal drs, wks ....lb.	.30	.30½	.30	.30½	.30	.30½
Silicate, drs, wks .....lb.	...	.77	...	.77	...	.77
Ethylene Dibromide, 60 lb drs ....lb.	.65	.70	.65	.70	.65	.70
Chlorhydrin, 40%, 10 gal cbys chloro, cont ....lb.	.75	.85	.75	.85	.75	.85
Anhydrous ....lb.	...	.75	...	.75	...	.75
Dichloride, 50 gal drs, wks lb.	.0545	.0994	.0545	.0994	.0545	.0994
Glycol, 50 gal drs, wks..lb.	.16	.20	.16	.21	.17	.21
tks, wks ....lb.	...	.15	.15	.16	...	.16
Mono Butyl Ether, drs, wks ....lb.	.18	.22	.18	.22	.20	.21
tks, wks ....lb.	...	.17	.17	.19	...	.19
Mono Ethyl Ether, drs, wks ....lb.	.15	.16	.15	.17	.16	.17
tks, wks ....lb.	...	.14	...	.15	...	.15
Mono Ethyl Ether Acetate, drs, wks .....lb.	.13	.14	.13	.14	...	.14
tks, wks ....lb.	...	.12	.12	.13	...	.13
Mono Methyl Ether, drs wks ....lb.	.17	.18	.17	.22	.18	.22
tks, wks ....lb.	...	.16	...	.17	...	.17
Oxide, cyl ....lb.	.50	.55	.50	.55	.50	.55
Ethylideneaniline ....lb.	.45	.47½	.45	.47½	.45	.47½
F						
Feldspar, blk pottery ....ton	17.00	19.00	17.00	19.00	17.00	19.00
Powd, blk, wks .....ton	14.00	14.50	14.00	14.50	14.00	14.50
Ferric Chloride, tech, crys, 475 lb bbls ....lb.	.05	.07½	.05	.07½	.05	.07½
sol, 42° cbys ....lb.	.06¼	.06½	.06¼	.06½	.06¼	.06½
Fish Scrap, dried, unground wks ....unit *l*	...	3.15	3.00	3.35	2.75	3.30
Acid, Bulk, 6 & 3%, delv Norfolk & Baltimore basis .... unit *m*	...	2.35	2.35	2.50	2.50	2.50
Fluorspar, 98% bgs .....lb.	30.00	31.60	30.00	33.00	...	33.00
Formaldehyde, USP, 400 lb bbls, wks ....lb.	.05¾	.06¼	.05¾	.06¼	.05¾	.06¼
Fossil Flour ....lb.	.02½	.04	.02½	.04	.02½	.04
Fullers Earth, blk, mines ton	10.00	11.00	10.00	11.00	10.00	11.00
Imp powd, c-l, bgs ...ton	23.00	30.00	23.00	30.00	23.00	30.00
Furfural (tech) drs, wks lb.	.10	.15	.10	.15	.10	.15
Furfuramide (tech) 100 lb. drs ....lb.	...	.30	...	.30	...	.30
Fusel Oil, 10% impurities lb.	.12½	.14	.12½	.14	.12½	.14
Fustic, crystals, 100 lb boxes ....lb.	.22	.26	.22	.26	.22	.26
Liquid 50°, 600 lb bbls lb.	.09½	.13	.09½	.13	.09½	.13
Solid, 50 lb boxes ......lb.	.17½	.19½	.17½	.19½	.17½	.19½
G						
G Salt paste, 360 lb bbls..lb.	.45	.47	.45	.47	.45	.47
Gambier, com 200 lb bgs lb.	.06¾	.07¾	.06¾	.07¾	.06¾	.07¾
Singapore cubes, 150 lb bgs ....100 lb.	.08	.09	.08	.09½	.08½	.11
Gelatine, tech, 100 lb cs ..lb.	.42	.43	.42	.50	.45	.50
Glauber's Salt, tech, c-l, bgs, wks* ....100 lb.	.95	1.15	.95	1.15	.95	1.15
Anhydrous, see Sodium Sulfate						

l + 10; *m* + 50; * Bbls. are 20c higher.

Current

	Current Market		1939 Low	1939 High	1938 Low	1938 High
Glue, bone, com grades, c-l bgs ....lb.	.11½	.13½	.11½	.13½	.13	.16½
Better grades, c-l, bgs lb.	.15	.16½	.15	.16½	.14½	.16½
Glycerin, CP, 550 lb drs lb.	...	.12½	...	.12½	.12½	.16
Dynamite, 100 lb drs..lb.	...	nom.	...	.09	.12¾	.16
Saponification, drs ....lb.	.09	.10	.08½	.10	.08½	.11¼
Soap Lye, drs ....lb.	.07¾	.07⅞	.07½	.07⅞	.07½	.10¼
Glyceryl Bori-Borate, bbls lb.	...	.40	...	.40	...	.40
Monoricinoleate, bbls ..lb.	...	.27	...	.27	...	.27
Monostearate, bbls .....lb.	...	.30	...	.30	...	.30
Oleate, bbls ....lb.	...	.22	...	.22	...	.22
Phthalate ....lb.	...	.37	...	.37	...	.37
Glyceryl Stearate, bbls ...lb.	...	.18	...	.18	...	.18
Glycol Bori-Borate, bbls..lb.	...	.22	.22	.23	...	.26
Phthalate, drs ....lb.	...	.38	.38	.40	...	.40
Stearate, drs ....lb.	...	.24	.24	.27½	...	.27½
GUMS						
Gum Aloes, Barbadoes ...lb.	.85	.90	.85	.90	.85	.90
Arabic, amber sorts ...lb.	.10¼	.10¾	.09	.11	.09	.12
White sorts, No. 1, bgs lb.	23	.24	.23	.24	.23	.28
No. 2, bgs ....lb.	21	.22	.21	.22	.21	.26
Powd, bbls ....lb.	.12½	.13⅜	.12½	.14	.12	.16
Asphaltum, Barbadoes (Man-jak) 200 lb bgs, f.o.b., NY ....lb.	.02½	.10½	.02½	.10½	.02½	.10½
California, f.o.b. NY, drs ton	29.00	55.00	29.00	55.00	29.00	55.00
Egyptian, 200 lb cases, f.o.b. NY ....lb.	.12	.15	.12	.15	.12	.15
Benzoin Sumatra, USP, 120 lb cases ....lb.	.17	.18	.17	.21	.15	.25
Copal, Congo, 112 lb bgs, clean, opaque ....lb.	...	.18¼	.18¼	.18¾	.18¾	.19¼
Dark amber ....lb.	...	.07⅛	...	.07⅛	.07⅛	.08⅞
Light amber ....lb.	...	.11¼	...	.11¼	.11¼	.13¼
Copal, East India, 180 lb bgs						
Macassar pale bold ...lb.	...	.11⅜	...	.11⅜	.11⅜	.13
Chips ....lb.	...	.05⅜	...	.05⅜	...	.05⅜
Dust ....lb.	...	.03¾	.03¼	.04	.03½	.04⅛
Nubs ....lb.	...	.09½	...	.09½	.09⅛	.10⅜
Singapore, Bold ....lb.	...	.14	.14	.14½	.14½	.15¼
Chips ....lb.	...	.05⅞	.05⅝	.06½	.04¾	.05⅜
Dust ....lb.	...	.03¾	.03¼	.04	.03¼	.04⅛
Nubs ....lb.	...	.09⅝	.09⅝	.10	.10	.10⅜
Copal Manila, 180-190 lb baskets, Loba A .....lb.	...	.10½	.10½	.11	.10½	.12
Loba B ....lb.	...	.10⅛	.09¾	.10¾	.10¼	.11⅝
Loba C ....lb.	...	.09¾	.09	.10⅜	.09¾	.11¼
DBB ....lb.	...	.07⅞	.07⅞	.08¼	.07⅞	.08¾
Dust ....lb.	...	.05¼	.05⅛	.05½	.05⅛	.06⅝
MA sorts ....lb.	...	.06⅛	.05⅞	.06⅜	.05⅞	.07¼
Copal Pontianak, 224 lb cases, bold genuine ....lb.	...	.15¼	...	.15¼	.15¼	.16½
Chips ....lb.	...	.07⅛	.07⅛	.08¼	.08¼	.10¼
Mixed ....lb.	...	.13⅜	.13⅜	.14	...	.14
Nubs ....lb.	...	.10½	.10½	.11⅜	.11⅜	.12⅞
Split ....lb.	...	.12	.12	.13½	.13½	.13⅞
Damar Batavia, 136 lb cases						
A ....lb.	...	.20	...	.20	.20	.25½
B ....lb.	...	.18½		.18½	.18½	.24
C ....lb.	...	.13½	.13½	.14⅞	.14⅞	.20⅜
D ....lb.	...	.12¼	.12¼	.13½	.13⅛	.17½
A/D ....lb.	...	.12¾	.12¾	.14½	.14½	.20⅜
A/E ....lb.	...	.11⅞	.11⅜	.12¼	.12¼	.17¼
E ....lb.	...	.07⅜	...	.07⅜	.07⅜	.08½
F ....lb.	...	.07¼	...	.07¼		.07¼
Singapore, No. 1 .....lb.	...	.13⅝	.13¼	.15¼	.15¼	.21⅛
No. 2 ....lb.	...	.10⅞	.10½	.11¼	.10⅜	.15⅜
No. 3 ....lb.	...	.05⅜	.05¼	.05⅝	.05	.05¾
Chips ....lb.	...	.09¼	...	.09¼	.09¼	.13½
Dust ....lb.	...	.05⅝	.05¼	.05⅝	.05	.05¾
Seeds ....lb.	...	.07⅜	...	.07⅜	.07⅜	.09½
Elemi, cns, c-l, ...lb.	...	.08⅛	...	.08⅛	.08⅛	.09½
Ester ....lb.	.06¼	.07	.06	.07	.06¼	.08½
Gamboge, pipe, cases .....lb.	.55	.60	.55	.60	.60	.80
Powd, bbls ....lb.	.60	.65	.60	.65	.65	.85
Ghatti, sol. bgs ....lb.	.11	.15	.11	.15	.11	.15
Karaya, bbls, bxs, drs,...lb.	.14	.23	.14	.23	...	...
Kauri, NY						
Brown XXX, cases ....lb.	.60	.60½	.60	.60½	.60	.60½
BX ....lb.	...	.38	...	.38	...	.38
B1 ....lb.	...	.28	...	.28	...	.28
B2 ....lb.	...	.24	...	.24	...	.24
B3 ....lb.	...	.18½	...	.18½	...	.18½
Pale XXX ....lb.	...	.61	...	.61	...	.61
No. 1 ....lb.	...	.41	...	.41	...	.41
No. 2 ....lb.	...	.24	...	.24	...	.24
No. 3 ....lb.	...	.17¾	...	.17¾	...	.17¾
Kino, tins ....lb.	3.50	nom.	2.50	3.50	2.00	2.75
Mastic ....lb.	.55	.56	.55	.56	.55	.56
Sandarac, prime quality, 200 lb bgs & 300 lb cks..lb.	.27	.28	.15	.28	.19	.26
Senegal, picked bags .....lb.	.25	.27	.25	.27	.23	.27
Sorts ....lb.	.10¼	.10¾	.09¼	.10¾	.09¼	.12
Thus, bbls ....280 lbs.	14.50	14.75	13.50	14.75	13.50	14.25
Tragacanth, No. 1, cases .lb.	2.25	2.35	2.25	2.45	2.40	3.00
No. 2 ....lb.	1.90	1.95	1.90	2.35	2.30	2.75
No. 3 ....lb.	1.60	1.65	1.60	1.95	1.90	2.70
Yacca, bgs ....lb.	.03½	.04½	.03½	.04½	.03½	.04½
H						
Helium, cyl (200 cu. ft.) cyl.	...	25.00	...	25.00	...	25.00
Hematine crystals, 400 lb bbls lb.	.18	.34	.18	.34	.18	.34
Hemlock, 25%, 600 lb bbls.						
wks ....lb.	.03	.03¼	.03	.03¼	.03	.03¼
tks ....lb.	...	.02⅝	...	.02⅝	.02⅝	.02¾

	Current	1939		1938	
	Market	Low	High	Low	High
Hexalene, 50 gal drs, wks lb.	...	.30	...	.30	...	.30
Hexane, normal 60-70° C. Group 3, tks .....gal.	...	.10½	...	.10½	...	.10½
Hexamethylenetetramine, powd, drs ....lb.	.32	.33	.32	.36	.35	.36
Hexyl Acetate, secondary, delv, drs ....lb.	.13	.13½	.13	.13½	.13	.13½
tks ....lb.	...	.12		.12	...	.12
Hoof Meal, f.o.b. Chicago unit	...	2.50	2.50	2.85	2.35	3.35
Hydrogen Peroxide, 100 vol, 140 lb cbys ....lb.	.19½	.20	.19½	.20	.19½	.20
Hydroxylamine Hydrochloride ....lb.	...	3.15	...	3.15	...	3.15
Hypernic, 51°, 600 lb bbls lb.	.13	.16	.13	.21	.16	.21
I						
Indigo, Bengal, bbls .....lb.	...	2.40	...	2.40	...	2.40
Synthetic, liquid ......lb.	.16½	.19	.16½	.19	.16½	.19
Iodine, Resublimed, jars .lb.	...	1.75	...	1.75	1.50	1.75
Irish Moss, ord, bales ...lb.	.10	.11	.10	.11	.10	.11
Bleached, prime, bales lb.	.19	.20	.19	.20	.19	.20
Iron Acetate Liq. 17°, bbls delv ....lb.	.03	.04	.03	.04	.03	.04
Chloride see Ferric Chloride.						
Nitrate, coml, bbls...100 lb.	2.32	3.11	2.32	3.11	2.32	3.11
Isobutyl Carbinol (128-132° C) drs, wks ....lb.	.33	.34	.33	.34	.33	.34
tks, wks ....lb.	...	.32	...	.32	...	.32
Isopropyl Acetate, tks, frt all'd ....lb.	...	.0510	...	.0510	.0510	.05½
drs, frt all'd ......lb.	.061	.066	.061	.066	.061	.07
Ether, see Ether, isopropyl.						
Keiselguhr, dom bags, c-l, Pacific Coast ....ton	22.00	85.00	22.00	85.00	22.00	85.00
L						
Lead Acetate, f.o.b. NY, bbls,						
White, broken ......lb.	...	.10	...	.10	.10	.11
cryst, bbls ....lb.	...	.10	...	.10	.10	.11
gran, bbls ....lb.	...	.10¾	...	.10¾	.10¾	.11¾
powd, bbls ....lb.	...	.10¾	...	.10¾	.10¾	.11¾
Arsenate, East, drs ...lb.	.10	.10¼	.10	.11½	.11	.13½
Linoleate, solid, bbls...lb.	...	.19		.19	...	.19
Metal, c-l, NY .....100 lb.	5.05	5.10	4.75	5.10	4.00	5.10
Nitrate, 500 lb bbls, wks lb.	.10	.11½	.10	.11½	.10	.11½
Oleate, bbls ....lb.	.18½	.20	.18½	.20	.18½	.20
Red, dry, 95% Pb_3O_4, delv ....lb.	...	.0760	.07¼	.08	.06½	.08
97% Pb_3O_4, delv ...lb.	...	.0785	.07½	.0785	.06¾	.081
98% Pb_3O_4, delv ...lb.	...	.0810	.07¾	.0810	.07	.0835
Resinate, precip, bbls ..lb.	...	.16½	...	.16½	...	.16½
Stearate, bbls ....lb.	...	.25	.22	.25	.22	.23
Titanate, bbls, c-l, f.o.b. wks, frt all'd ....lb.	.11	.11½	.11	.11½	.11	.11½
White, 500 lb bbls, wks lb.	...	.07	...	.07	.06	.07
Basic sulfate, 500 lb bbls, wks ....lb.	...	.06¼	...	.06¼	.05¼	.06¼
Lime, chemical quicklime, f.o.b., wks, bulk ...ton	7.00	8.00	7.00	8.00	7.00	8.00
Hydrated, f.o.b. wks...ton	8.50	12.00	8.50	12.00	8.50	12.00
Lime Salts, see Calcium Salts						
Lime sulfur, dealers, tks..gal.	.08	.11½	.08	.11½	.08	.11½
drs ....gal.	.11	.16	.11	.16	.11	.16
Linseed Meal, bgs ......ton	...	37.50	37.50	42.00	39.00	45.00
Litharge, coml, delv, bbls.lb.	...	.0660	.06¼	.0660	.05½	.066
Lithopone, dom, ordinary, delv, bgs ....lb.	...	.03¾	.03¾	.04⅛	.04⅛	.04⅝
bbls ....lb.	...	.04	.04	.04⅜	.04⅜	.04⅞
High strength, bgs ....lb.	...	.05¼	.05¼	.05⅝	.05⅝	.06⅛
bbls ....lb.	...	.05½	.05½	.05⅞	.05⅞	.06⅜
Titanated, bgs ....lb.	...	.05¼	.05¼	.05⅝	.05⅝	.06⅛
bbls ....lb.	...	.05½	.05½	.05⅞	.05⅞	.06⅜
Logwood, 51°, 600 lb bbls lb.	.09½	.11½	.09½	.11½	.09½	.11½
Solid, 50 lb boxes .....lb.	.15	.19	.15	.19	.15	.19
Sticks ....ton	24.00	25.00	24.00	25.00	24.00	25.00
M						
Madder, Dutch ....lb.	.22	.25	.22	.25	.22	.25
Magnesite, calc, 500 lb bbls ton	60.00	65.00	60.00	65.00	60.00	65.00
Magnesium Carb, tech, 70 lb bgs, wks ....lb.	...	.06¼	.05¾	.06½	.05¾	.07
Chloride flake, 375 lb drs, c-l, wks ....ton	39.00	42.00	39.00	42.00	39.00	42.00
Fluosilicate, crys, 400 lb bbls, wks ....lb.	.10	.10½	.10	.10½	.10	.10½
Oxide, calc tech, heavy bbls, frt all'd ...lb.	.25	.30	.25	.30	.25½	.30½
Light, bbls above basis lb.	.20	.25	.20	.25	.20	.25½
USP Heavy, bbls, above basis ....lb.	.25	.30	.25	.30	.25	.30½
Palmitate, bbls ....lb.	.33	nom.	.33	nom.	...	.33
Silicofluoride, bbls ...lb.	.09½	.10½	.09½	.10½	.09½	.10½
Stearate, bbls ....lb.	.21	.24	.21	.24	.21	.24
Manganese acetate, drs...lb.	...	.26½	...	.26½	...	.26½
Borate, 30%, 200 lb bbls lb.	.15	.16	.15	.16	.15	.16
Chloride, 600 lb cks ...lb.	.08¼	.08¾	.07½	.12	.09	.12
Dioxide, tech (peroxide), paper bags, c-l ......ton	...	47.50	...	47.50	47.50	62.50
Hydrate, bbls ....lb.	...	.32	...	.32	...	.32
Linoleate, liq, drs .....lb.	.18	.19¼	.18	.19¼	.18	.19¼
solid, precip, bbls ...lb.	...	.19	...	.19	...	.19
Resinate, fused, bbls...lb.	.08¼	.08½	.08¼	.08½	.08¼	.08½
precip, drs ....lb.	...	.12	...	.12	...	.12
Sulfate, tech, anhyd, 90-95%, 550 lb drs ...lb.	.07	.07½	.07	.07½	.07	.07½

Current

Mangrove
Octyl Acetate

	Current Market		1939 Low	1939 High	1938 Low	1938 High
Mangrove, 55%, 400 lb bbls lb.		.04	...	.04	.	.04
Bark, African ....ton	25.00	26.00	23.00	26.00	23.00	24.50
Mannitol, pure cryst, cs, wks lb.	.95	1.00	.95	1.20	1.15	1.45
commercial grd, 250 lb bbl ....lb.	.42	.50	.42	.57	...	...
Marble Flour, blk ......ton	12.00	13.00	12.00	13.00	12.00	13.00
Mercury chloride (Calomel) lb.	...	1.52	1.36	1.52	1.18	1.59
Mercury metal .76 lb. flasks	...	92.00	95.00	97.00	73.00	84.50
Mesityl Oxide, f.o.b. dest., tks. ....lb.	...	.10½	.10½	.20	...	...
drs, c.l. ....lb.	...	.11½	.11½	.21	...	...
drs, l.c.l. ....lb.	...	.12	.12	.21½	..	
Meta-nitro-aniline ....lb.	.67	.69	.67	.69	.67	.69
Meta-nitro-paratoluidine 200 lb bbls ....lb.	1.30	1.40	1.30	1.55	1.45	1.55
Meta-phenylene diamine 300 lb bbls ....lb.	.80	.84	.80	.84	.80	.84
Meta-toluene-diamine 300 lb bbls ....lb.	.65	.67	.65	.67	.65	.67
Methanol, denat, grd, drs, c-l, frt all'd ....gal.	...	.46	.41	.46	.30	.41
tks, frt all'd ....gal.	...	.40	.35	.40	.25	.35
Pure, drs, c-l, frt all'd gal.	...	.38	...	.38	...	.38
tks ....gal.	...	.33	...	.33	...	.33
95%, tks ....gal.	...	.31	...	.31	...	.31
97%, tks ....gal.	...	.32	...	.32	...	.32
Methyl Acetate, tech, tks, delv ....lb.	...	.06	.06	.06½	...	.06½
55 gal drs, delv .....lb.	.07	.08	.07	.08	.07½	.08
C.P. 97-99%, tks, delv lb.	...	.06¼	...	.06¼	.06¼	.07
55 gal drs, delv ....lb.	.07¼	.07¾	.07¼	.07¾	.07¼	.08½
Acetone, frt all'd, drs gal. *p*	.33	.39	.30	.39	.30	.40½
tks, frt all'd, drs ..gal. *p*	...	.28	.25	.29	.25	.32½
Synthetic, frt all'd, east of Rocky M., drs ....gal. *p*	.38	.41	.38	.41	.38	.51
tks, frt all'd ...gal.	...	.31½	...	.31½	.31½	.39½
West of Rocky M., frt all'd, drs ..gal. *p*	...	.42	...	.42	.42	.46
tks, frt all'd...gal. *p*	...	.35	...	.35	.35	.39½
Anthraquinone ....lb.	...	.83	...	.83	...	.83
Butyl Ketone, tks .....lb.	...	.10½	...	.10½	...	.10½
Chloride, 90 lb cyl .....lb.	.32	.40	.32	.40	.32	.40
Ethyl Ketone, tks, frt all'd lb.	...	.05	...	.05	.05	.06
50 gal drs, frt all'd c-l lb.	...	.06	...	.06	.06	.07
Formate, drs, frt all'd..lb.	.35	.36	.35	.36	.35	.36
Hexyl Ketone, pure, drs lb.	...	.60	...	.60	...	.60
Lactate, drs, frt all'd ..lb.	...	.30	...	.30	...	.30
Mica, dry grd, bgs, wks ..lb.	...	30.00	...	30.00	30.00	35.00
Michler's Ketone, kgs....lb.	...	2.50	...	2.50	...	2.50
Monoamylamine, c-l, drs, wks lb.	...	.52	...	.52	.52	1.00
l.c.l. drs, wks ....lb.	.53	.55	...	...	...	...
tks, wks ....lb.	...	.50	...	...	...	...
Monobutylamine, drs, c.l., wks ....lb.	...	.50	.50	.65	...	.65
l.c.l., wks ....lb.	.51	.53	...	...	...	...
tks, wks ....lb.	...	.48	...	...	...	...
Monochlorobenzene, see "C"						
Monoethanolamine, tks, wks lb.	...	.23	...	.23	...	.23
Monomethylamine, drs, frt all'd, E. Mississippi, c-l lb.	...	.65	...	.65	...	.65
Monomethylparaminosulfate, 100 lb drs ....lb.	3.75	4.00	3.75	4.00	3.75	4.00
Morpholine, drs 55 gal, lcl wks ....lb.		.75	...	...	...	...
Myrobalans 25%, liq bbls lb.	.03¾	.04¼	.03¾	.04¼	.03¾	.04¼
50% Solid, 50 lb boxes lb.	.04¼	.05	.04¼	.05	.04⅜	.06¼
J1 bgs ....ton	...	24.00	24.00	26.00	23.50	30.00
J2 bgs ....ton	...	19.00	19.00	20.00	17.00	22.00
R2 bgs ....ton	...	16.75	16.75	17.25	17.00	22.00
N						
Naphtha, v.m.&p. (deodorized) see petroleum solvents.						
Naphtha, Solvent, water-white, tks ....gal.	...	.26	...	.26	.26	.31
drs, c-l ....gal.	...	.31	...	.31	.31	.36
Naphthalene, dom, crude bgs, wks ....lb.	2.25	2.85	2.25	2.85	2.25	2.85
Imported, cif, bgs ...lb.	...	1.55	1.50	1.85	1.40	2.25
Balls, flakes, pks ......lb.	...	.06½	...	.06½	.06½	.08
Balls, ref'd, bbls, wks ..lb.	...	.05¾	...	.05¾	.05¾	.07¼
Flakes, ref'd, bbls, wks lb.	...	.05¾	...	.05¾	.05¾	.07¼
Nickel Carbonate, bbls ..lb.	.36	.37½	.36	.37½	.36	.37½
Chloride, bbls ....lb.	.18	.20	.18	.20	.18	.20
Metal ingot ....lb.	...	.35	...	.35	...	.35
Oxide, 100 lb kgs, NY lb.	.35	.37	.35	.37	.35	.37
Salt, 400 lb bbls, NY .lb.	.13	.13½	.13	.13½	.13	.13½
Single, 400 lb bbls, NY lb.	.13	.13½	.13	.13½	.13	.13½
Nicotine, 40%, drs, sulfate, 55 lb drs ....lb.	...	.70	.70	.76	...	.76
Nitre Cake, blk ....ton	...	16.00	...	16.00	...	16.00
Nitrobenzene, redistilled, 1000 lb drs, wks ....lb.	.08	.10	.08	.10	.08	.10
tks ....lb.		.07	.07	.07½	...	.07½
Nitrocellulose, c-l, l-c-l, wks lb.	.22	.29	.22	.29	.22	.29
Nitrogen Sol. 45½% ammon., f.o.b. Atlantic & Gulf ports, tks, unit ton, N basis	...	1.2158	...	...	...	...
Nitrogenous Mat'l, bgs, imp unit	...	2.25	2.25	2.50	2.35	2.65
dom, Eastern wks ...unit	...	2.30	2.30	2.50	2.50	2.75
dom, Western wks ...unit	...	1.90	1.90	2.25	2.20	2.35
Nitronaphthalene, 550 lb bbls lb.	.24	.25	.24	.25	.24	.25
Nutgalls Alleppo, bgs ....lb.	...	.23	.22	.23	.23	.23
O						
Oak Bark Extract, 25%, bbls lb.	...	.03½	.03⅛	.03½	...	.03⅛
tks ....lb.	...	.02¾	...	.02¾	...	.02¾
Octyl Acetate, tks, wks ...lb.	...	.15	.15	.17	.16	.17

a Country is divided in 4 zones, prices varying by zone; *p* Country is divided into 4 zones. Also see footnote directly above; *q* Naphthalene quoted on Pacific Coast F.A S. Phila., or N. Y.

	Current Market		1939 Low	1939 High	1938 Low	1938 High
Orange-Mineral, 1100 lb cks NY . . . . lb.	. . .	.10½	.10¼	.10½	.09½	.10½
Orthoaminophenol, 50 lb kgs lb.	2.15	2.25	2.15	2.25	2.15	2.25
Orthoanisidine, 100 lb drs lb.	.70	.74	.70	.74	.70	.74
Orthochlorophenol, drs . . . lb.	. . .	.32	. . .	.32	.32	.75
Orthocresol, 30.4°, drs, wks lb.	.14½	.15	.14½	.17½	.13½	.17½
Orthodichlorobenzene, 1000 lb drs . . . . lb.	.06	.07	.06	.07	.06	.07
Orthonitrochlorobenzene, 1200 lb drs, wks . . . . lb.	.15	.18	.15	.18	.15	.18
Orthonitroparachlorphenol, tins . . . . lb.	. . .	.75	. . .	.75	. . .	.75
Orthonitrophenol, 350 lb drs . . . . lb.	.85	.90	.85	.90	.85	.90
Orthonitrotoluene, 1000 lb drs. wks . . . . lb.	. . .	.09	.08	.10	.08	.10
Orthotoluidine, 350 lb bbls, l-c-l . . . . lb.	. . .	.19	.16	.19	16	.17
Osage Orange, cryst, bbls lb.	.19	.25	.17	.25	.17	.25
51° liquid . . . . lb.	. . .	.09	.07	.09	.07	.08
P						
Paraffin, rfd, 200 lb bgs						
122-127° M P . . . . lb.	.03¾	.039	.03¾	.039	.03¾	.04½
128-132° M P . . . . lb.	.04	.0435	.04	.0435	.04	.049
133-137° M P . . . . lb.	. . .	.0465	. . .	.0465	.0465	.05¾
Para aldehyde, 99%, tech, 110-55 gal drs, wks lb.	.10	.11¼	.10	.16*	.16*	.18*
Aminoacetanilid, 100 lb kgs . . . . lb.	. . .	.85	. . .	.85	. . .	.85
Aminohydrochloride, 100 lb kgs . . . . lb.	1.25	1.30	1.25	1.30	1.25	1.30
Aminophenol, 100 lb kgs lb.	. . .	1.05	. . .	1.05	. . .	1.05
Chlorophenol, drs . . . . . lb.	.30	.45	.30	.45	.30	.45
Dichlorobenzene, 200 lb drs, wks . . . . lb.	.11	.12	.11	.12	.11	.12
Formaldehyde, drs, wks lb.	.34	.35	.34	.35	.34	.35
Nitroacetanilid, 300 lb bbls . . . . lb.	.45	.52	.45	.52	.45	.52
Nitroaniline, 300 lb bbls, wks . . . . lb.	.45	.47	.45	.47	.45	.47
Nitrochlorobenzene, 1200 lb drs, wks . . . . lb.	.15	.16	.15	.16	.15	.16
Nitro-orthotoluidine, 300 lb bbls . . . . lb.	2.75	2.85	2.75	2.85	2.75	2.85
Nitrophenol, 185 lb bbls lb.	.35	.37	.35	.37	.35	.37
Nitrosodimethylaniline, 120 lb bbls . . . . lb.	.92	.94	.92	.94	.92	.94
Nitrotoluene, 350 lb bbls lb.	. . .	.30	.30	.35	. . .	.35
Phenylenediamine, 350 lb bbls . . . . lb.	1.25	1.30	1.25	1.30	1.25	1.30
Toluenesulfonamide, 175 lb bbls. . . . . lb.	.70	.75	.70	.75	.70	.75
tks, wks . . . . lb.	. . .	.31	. . .	.31	. . .	.31
Toluenesulfonchloride, 410 lb bbls, wks . . . . lb.	.20	.22	.20	.22	.20	.22
Toluidine, 350 lb bbls, wks . . . . lb.	.48	.50	.48	.58	.56	.58
Paris Green, dealers, drs lb.	.23	.26	.23	.26	.23	.26½
Pentane, normal, 28-38° C, group 3, tks . . . . gal.	. . .	.08½	. . .	.08½	. . .	.08½
drs, group 3 . . . . gal.	.11½	.16	.11½	.16	.11½	.16
Perchlorethylene, 100 lb drs, frt all'd . . . . lb.	.08	.08¾	.08	.10½	. . .	.10½
Petrolatum, dark amber, bbls . . . . lb.	.02⅝	.02¾	.02⅝	.02¾	.02⅝	.03⅞
Light, bbls . . . . lb.	.03⅛	.03⅜	.03⅛	.03⅜	.03⅛	.03⅜
Medium, bbls . . . . lb.	.02⅞	.03⅛	.02⅞	.03⅛	.02⅞	.03⅛
Dark green, bbls . . . . . . lb.	.02½	.02¾	.02½	.02¾	.02½	.02¾
Red, bbls . . . . lb.	.02½	.03⅝	.02½	.03⅝	.02½	.03⅝
White, lily, bbls . . . . . lb.	.05¼	.07⅛	.05¼	.07⅛	.05¼	.07⅛
White, snow, bbls . . . . lb.	.06¼	.08⅛	.06¼	.08⅛	.06¼	.08⅛
Petroleum Ether, 30-60°, group 3, tks . . . . . gal.	. . .	.13	. . .	.13	. . .	.13
drs, group 3 . . . . gal.	.14	.17	.14	.17	.14	.17
PETROLEUM SOLVENTS AND DILUENTS						
Cleaners naphthas, group 3, tks, wks . . . . gal.	.06⅜	.06⅝	.06⅜	.06⅝	.06⅜	.07⅜
East Coast, tks, wks gal.	. . .	.10	. . .	.10	. . .	.10
Hydrogenated, naphthas, frt all'd East, tks . . . . gal.	. . .	.16	. . .	.16	. . .	.16
No. 2, tks . . . . gal.	. . .	.18	. . .	.18	. . .	.18
No. 3, tks . . . . gal.	. . .	.16	. . .	.16	. . .	.16
No. 4, tks . . . . gal.	. . .	.18	. . .	.18	. . .	.18
Lacquer diluents, tks, East Coast . . . . gal.		.09	.09	.12½	.12	.12½
Group 3, tks . . . . gal.	.07⅜	.07⅝	.07⅜	.07⅝	.07⅜	.08⅜
Naphtha, V.M.P., East, tks wks . . . . gal.	. .	.09	.09	.10	.09½	.10
Group 3, tks, wks . . gal.	.06⅜	.06⅝	.06⅜	.06⅝	.06⅜	.07⅜
Petroleum thinner, 43-47, East, tks, wks . . . . . gal.	. . .	.08½	.08½	.10	.08½	.10
Group 3, tks, wks . . gal.	.05⅜	.05⅝	.05⅜	.05⅝	.05⅜	.06⅜
Rubber Solvents, stand grd. East, tks, wks . . . . gal.	. .	.09	.09	.10	.09½	.10
Group 3 tks, wks . . . gal.	.06⅜	.06⅝	.06⅜	.06⅝	.06⅜	.07⅜
Stoddard Solvent, East, tks, wks . . . . gal.	. . .	.08½	.08½	.10	.09½	.10
Group 3, tks, wks . . gal.	.05⅞	.06⅛	.05⅞	.06⅛	.05⅞	.06⅞
Phenol, 250-100 lb drs . . . lb.	.13	.14¾	.13	.15½	.14½	.15½
tks, wks . . . . lb.	. . .	.12	.12	.13½	. . .	.13½
Phenyl-Alpha-Naphthylamine, 100 lb kgs . . . . lb.	. . .	1.35	. . .	1.35	. . .	1.35
Phenyl Chloride, drs . . . . lb.	. . .	.17	. . .	.17	. . .	.17
Phenylhydrazine Hydrochloride, com . . . . lb.	. . .	1.50	. . .	1.50	. . .	1.50

* These prices were on a delivered basis.

Current

	Current Market		1939 Low	1939 High	1938 Low	1938 High
Phloroglucinol, tech, tins . . lb.	15.00	16.50	15.00	16.50	15.00	16.50
CP, tins . . . . lb.	20.00	22.00	20.00	22.00	20.00	22.00
Phosphate Rock, f.o.b. mines						
Florida Pebble, 68% basis ton	. . .	1.85	. . .	1.85	. . .	1.85
70% basis . . . . ton	. . .	2.35	. . .	2.35	. . .	2.35
72% basis . . . . ton	. . .	2.85	. . .	2.85	. . .	2.85
75-74% basis . . . . ton	. . .	3.85	. . .	3.85	. . .	3.85
75% basis . . . . ton	. . .	5.50	. . .	5.50	. . .	5.50
Tennessee, 72% basis . . ton	. . .	4.50	. . .	4.50	. . .	4.50
Phosphorus Oxychloride 175 lb cyl . . . . lb.	.16	.20	.16	.20	.16	.20
Red, 110 lb cases . . . . . lb.	40	.44	.40	.44	.40	.44
Sesquisulfide, 100 lb cs . . lb.	.38	.44	.38	.44	.38	.44
Trichloride, cyl . . . . lb.	.15	.18	.15	.18	.15	.18
Yellow, 110 lb cs, wks . lb.	.24	.30	.24	.30	.24	.30
Phthalic Anhydride, 100 lb drs, wks . . . . lb.	. . .	.14½	. . .	.14½	. . .	.14½
Pine Oil, 55 gal drs or bbls						
Destructive dist . . . . lb.	46	.48	.46	.48	.46	.55
Steam dist wat wh bbls gal.	. . .	.59	. . .	.59	. . .	.59
tks . . . . gal.	. . .	.54	. . .	.54	. . .	.54
Pitch Hardwood, wks . . . ton	18.25	18.75	18.25	18.75	18.25	18.75
Coaltar, bbls, wks . . . . ton	. . .	19.00	. . .	19.00	. . .	19.00
Burgundy, dom, bbls, wks lb.	.05½	.06½	.05½	.06½	.05½	.06½
Imported . . . . lb.	.15	.16	.15	.16	.15	.16
Petroleum, see Asphaltum in Gums' Section.						
Pine, bbls . . . . bbl.	6.00	6.25	6.00	6.25	5.75	6.25
Stearin, drs . . . . lb.	.03	.04½	.03	.04½	.03	.04½
Platinum, ref'd . . . . oz.	32.00	35.00	32.00	35.00	30.00	39.00
POTASH						
Potash, Caustic, wks, sol . . lb.	.06¼	.06½	.06¼	.06½	.06¼	.06½
flake . . . . lb.	.07	.07⅜	.07	.07⅜	.07	.07⅜
Liquid, tks . . . . lb.	. . .	.02⅞	. . .	.02⅞	. . .	.02⅞
Manure Salts, imported 30% basis, blk . . . . unit	. . .	.58½	. . .	.58½	. . .	.58½
Potassium Abietate, bbls . . lb.	. . .	.09	. . .	.09	.08	.13
Acetate, tech, bbls, delv lb.	. . .	.26	. . .	.26	.26	.28
Bicarbonate, USP, 320 lb bbls . . . . lb.	. . .	.18	. . .	.18	. . .	.18
Bichromate Crystals, 725 lb cks* . . . . lb.	.08¾	.09¼	.08¾	.09¼	.08¾	.09¼
Binoxalate, 300 lb bbls . . lb.	. . .	.23	. . .	.23	. . .	.23
Bisulfate, 100 lb kgs . . . . lb.	.15½	.18	.15½	.18	.15½	.18
Carbonate, 80-85% calc 800 lb cks . . . . lb.	.06½	.07	.06½	.07	.06½	.07
liquid, tks . . . . lb.	. . .	.02⅞	. . .	.02⅞	. . .	.02⅞
drs, wks . . . . lb.	.03	.03½	.03	.03½	.03	.03½
Chlorate crys, 112 lb kgs, wks . . . . lb.	.09¼	.09½	.09¼	.09½	.09¼	.09½
gran, kgs . . . . lb.	.12	.13	.12	.13	.12	.13
powd, kgs . . . . lb.	.08½	.08¾	.08½	.08¾	.08½	.08¾
Chloride, crys, bbls . . . . lb.	.04	.04¾	.04	.04¾	.04	.04¾
Chromate, kgs . . . . lb.	.19	.28	.19	.28	.19	.28
Cyanide, 110 lb cases . . . lb.	.50	.55	.50	.55	.50	.57½
Iodide, 250 lb bbls . . . . lb.	. . .	1.13	. . .	1.13	.93	1.13
Metabisulfite, 300 lb bbls lb.	.11	.12½	.11	.13½	.12	.15
Muriate, bgs, dom, blk unit	. . .	.53½	. . .	.53½	. . .	.53½
Oxalate, bbls . . . . lb.	.25	.26	.25	.26	.25	.26
Perchlorate, kgs, wks . . . lb.	.09	.10½	.09	.10½	.09	.11½
Permanganate, USP, crys, 500 & 1000 lb drs, wks lb.	.18½	.19½	.18½	.19½	.18½	.19½
Prussiate, red, bbls . . . . lb.	.30½	.34	.30½	.34	.30½	.37
Yellow, bbls . . . . lb.	.14	.15	.14	.16	.15	.16
Sulfate, 90% basis, bgs ton	. . .	36.25	36.25	38.00	. . .	38.00
Titanium Oxalate, 200 lb bbls . . . . lb.	.35	.40	.35	.40	.35	.40
Pot & Mag Sulfate, 48% basis bgs . . . . ton	. . .	24.75	24.75	25.75	. . .	25.75
Propane, group 3, tks . . . . lb.	.03	.04⅜	.03	.04⅜	.03	.04⅜
Putty, coml, tubs . . . 100 lb.	. . .	3.00	. . .	3.00	2.25	3.00
Linseed Oil, kgs . . . . 100 lb.	. . .	4.50	. . .	4.50	4.00	4.65
Pyrethrum, conc liq:						
2.4% pyrethrins, drs, frt all'd . . . . gal.	7.15	7.50	5.75	7.50	5.00	6.75
3.6% pyrethrins, drs, frt all'd . . . . gal.	10.65	11.00	8.45	11.00	7.65	9.95
Flowers, coarse, Japan, bgs . . . . lb.	.33	.36	.26	.36	.18	.28½
Fine powd, bbls . . . . . lb.	.35	.37	.27	.37	.19	.30
Pyridine, denat, 50 gal drs gal.	. . .	1.63	. . .	1.63	1.53	1.63
Refined, drs . . . . lb.	. . .	.50	. . .	.50	.45	.50
Pyrites, Spanish cif Atlantic ports, blk . . . . unit	.12	.13	.12	.13	.12	.13
Pyrocatechin, CP, drs, tins lb.	2.15	2.75	2.15	2.75	2.15	2.75
Q						
Quebracho, 35% liq tks . . lb.	. . .	.02⅞	.02⅞	.03⅜	.03	.03⅜
450 lb bbls, c-l . . . . . . lb.	. . .	.04	.04	.04⅛	.03½	.04⅛
Solid, 63%, 100 lb bales cif . . . . lb.	. . .	.04	. . .	.04	. . .	.04
Clarified, 64%, bales . . lb.	. . .	.04¼	. . .	.04¼	. . .	.04¼
Quercitron, 51 deg liq, 450 lb bbls . . . . lb	.07½	.08½	.07½	.08½	.06	.08½
Solid, drs . . . . lb.	.10	.12	.10	.12	.10	.12
R						
R Salt, 250 lb bbls, wks . lb.	.52	.55	.52	.55	.52	.55
Resorcinol tech, cans . . . . . lb.	.75	.80	.75	.80	.75	.80
Rochelle Salt, cryst . . . . . lb.	.18¾	.19¼	.17¾	.19¼	.15	.18¼
Powd, bbls . . . . lb.	.17¾	.18¼	.16¾	.18¼	.16	.18½
Rosin Oil, bbls, first run gal.	.45	.47	.45	.47	.45	.60
Second run . . . . gal.	.47	.49	.47	.49	.47	.62
Third run, drs . . . . gal.	.51	.53	.51	.53	.51	.66

* Spot price is ⅛c higher.

	Current Market		1939 Low	1939 High	1938 Low	1938 High
Rosins 600 lb bbls, 280 lb unit ex. yard NY:***						
B	...	5.30	4.60	5.40	4.65	6.00
D	...	5.30	4.95	5.70	4.75	6.00
E	...	5.40	5.20	5.90	4.90	6.00
F	...	5.70	5.50	6.30	5 05	7.00
G	...	5.90	5.75	7.00	5.25	7.05
H	6.30	6.37½	5.75	7.10	5 25	7.15
I	6.37½	6.40	5.77½	7.12½	5.25	7.15
K	...	6.35	5.80	7.15	5.25	7.25
M	...	6.40	5.90	7.25	5.25	7.40
N	6.50	6.52½	6.75	7.40	6.20	7.50
WG	...	7.00	7.10	7.70	6.75	8.45
WW	...	7.45	7.45	8.50	7.55	9.15
Rosins, Gum, Savannah (280 lb unit):**						
B	...	3.90	3.25	4.00	3.25	4.60
D	3.90	4.30	3.55	4.30	3.50	4.60
E	...	4 00	3.80	4.50	3.55	4.60
F	4.00	4.90	4.00	4.90	3.90	5.60
G	..	4.50	4.40	5.60	4.10	5.65
H	4.90	4.97½	4.40	5.70	4.20	5 75
I	4.97½	5.00	4.40	5.72½	4.20	5.85
K	4.97½	5 00	4.40	5.75	4 20	6.00
M	.	5.00	4.40	5.85	4.20	6.15
N	5.10	5.12½	5.10	6 00	4.80	6 20
WG	...	5.60	5.60	6.30	5.40	7.05
WW	...	5.60	5.60	7.10	6.10	7.75
X	...	6.05	6.05	7.10	6.10	7.75
Rosin, Wood, c-l, FF grade, NY	4.00	6.45	5.35	5.25	5.05	6.40
Rotten Stone, bgs mines..ton	25.50	37.50	22.50	37.50	22.50	35.00
Imported, lump, bbls ..lb.	...	.14	...	.14	.12	.14
Powdered, bbls ......lb.	.08½	.10	.08½	.10	.08½	.10
S						
Sago Flour, 150 lb bgs...lb.	.02½	.03½	.02½	.03½	.02½	.03¼
Sal Soda, bbls, wks ..100 lb.	...	1.20	...	1.20	...	1.20
Salt Cake, 94-96%, c-l, wks ton	19.00	25.00	19.00	25.00	19.00	23.00
Chrome, c-l, wks .....ton	11.00	12.00	11.00	12.00	11.00	12.00
Saltpetre, gran, 450-500 lb bbls ....lb.	.06½	.069	.06½	.069	.06½	.069
Cryst, bbls ....lb.	.07½	.0865	.07½	.0865	.07½	.0865
Powd, bbls ....lb.	.07½	.079	.07½	.079	.07½	.079
Satin, White, pulp, 550 lb bbls ....lb.	.01¼	.01½	.01¼	.01½	.01¼	.01½
Schaeffer's Salt, kgs .....lb.	.46	.48	.46	.48	.46	.48
Shellac, Bone dry, bbls..lb. r	.18	.19	.18	.20	.16½	.20
Garnet, bgs ....lb.	.12½	.13	.12½	.13	.12½	.15
Superfine, bgs ....lb. s	.10	.10½	.10	.11½	.11	.13½
T. N., bgs ....lb. s	.09½	.10	.09½	.11	.10½	.12½
Silver Nitrate, vials .....oz.	.27¼	.29½	.26⅞	.33½	.33½	.34⅞
Slate Flour, bgs, wks...ton	9.00	10.00	9.00	10.00	9.00	10.00
Soda Ash, 58% dense, bgs, c-l, wks ....100 lb.	...	1.10	...	1.10	...	1.10
58% light, bgs .....100 lb.	...	1.08	...	1.08	...	1.08
blk ....100 lb.	...	.90	...	.90	...	.90
paper bgs ....100 lb.	...	1.05	...	1.05	...	1.05
bbls ....100 lb.	...	1.35	...	1.35	...	1.35
Caustic, 76% grnd & flake, drs ....100 lb.	...	2.70	...	2.70	...	2.70
76% solid, drs ....100 lb.	...	2.30	...	2.30	...	2.30
Liquid sellers, tks ..100 lb.	...	1.97½	...	1.97½	...	1.97½
Sodium Abietate, drs ....lb.	...	.11	...	.11	.10	.13
Acetate, 60% tech, gran, powd, flake, 450 lb bbls wks ....lb.	.04	.05	.04	.05	.04	.05
anhyd, drs, delv .....lb.	...	.08¼	...	.08¼	...	.08¼
Alginate, drs ....lb.	.71	.95	.70	.95	.69	.70
Antimoniate, bbls ......lb.	.11½	.12	.11½	.12½	.12	.15¼
Arsenate, drs ....lb.	.08	.08½	.08	.08½	.08	.08½
Arsenite, liq, drs .....gal.	...	.35	.30	.35	.30	.33
Dry, gray, drs, wks..lb.	.07½	.09½	.07½	.09½	.07½	.09½
Benzoate, USP kgs ...lb.	.46	.48	.46	.48	.46	.48
Bicarb, powd, 400 lb bbl, wks ....100 lb.	...	1.85	...	1.85	...	1.85
Bichromate, 500 lb cks, wks*	.06¾	.07¼	.06¾	.07¼	.06¾	.07¼
Bisulfite, 500 lb bbls, wks lb.	.033	.036	.03¼	.036	.03	.036
35-40% sol bbls, wks 100 lb.	1.40	1.80	1.40	1.80	1.40	1.80
Chlorate, bgs, wks .....lb.	.06¼	.07½	.06¼	.07½	.06¼	.07½
Cyanide, 96-98%, 100 & 250 lb drs, wks .....lb.	.14	.15	.14	.15	.14	.17½
Diacetate, 33-35% acid, bbls, lcl, delv ......lb.	...	.09	...	.09	...	.09
Fluoride, white 90%, 300 lb. bbls, wks ....lb.	.07¼	.08¾	.07¼	.08¾	.07½	.08¼
Hydrosulfite, 200 lb bbls, f.o.b. wks ....lb.	.16	.17	.16	.17	.16	.17
Hyposulfite, tech, pea crys 375 lb bbls, wks 100 lb.	...	2.80	...	2.80	2.50	2.80
Tech, reg cryst, 375 lb bbls, wks ......100 lb.	2.45	2.80	2.45	2.80	2.40	2.80
Iodide, jars ....lb.	...	2.10	...	2.10	1.90	2.10
Metal, drs, 280 lbs ....lb.	...	.19	...	.19	...	.19
Metanilate, 150 lb bbls..lb.	.41	.42	.41	.42	.41	.42
Metasilicate, gran, c-l, wks ....100 lb.	...	2.20	...	2.20	2.15	2.20
cryst, drs, c-l, wks 100 lb.	...	2.90	...	2.90	2.75	2.90
Monohydrated, bbls ....lb.	...	.023	...	.023	...	.023
Naphthenate, drs ....lb.	.12	.19	.12	.19	.12	.19
Naphthionate, 300 lb bbl lb.	...	.50	.50	.54	.52	.54
Nitrate, 92%, crude, 200 lb bgs, c-l, NY ....ton	...	28.30	...	28.30	...	28.30
100 lb bgs ....ton	...	29.00	...	29.00	...	29.00
Bulk ....ton	...	27.00	...	27.00	...	27.00

r Bone dry prices at Chicago 1c higher; Boston ½c; Pacific Coast 2c; Philadelphia deliveries f.o.b. N. Y.; refined 6c higher in each case; s T. N. and Superfine prices quoted f.o.b. N. Y. and Boston; Chicago prices 1c higher; Pacific Coast 3c; Philadelphia f.o.b. N. Y. * Spot price is ⅛c higher. ** June 30. *** June 30.

Current

Sodium Nitrite
Tartar Emetic

	Current Market		1939 Low	1939 High	1938 Low	1938 High
Sodium (continued):						
Nitrite, 500 lb bbls . . . lb.	.06¾	.11½	.06¾	.11½	.06¾	.11½
Orthochlorotoluene, sulfonate, 175 lb bbls, wks . . lb.	.25	.27	.25	.27	.25	.27
Orthosilicate, 300 lb drs, c.l. . . . . lb.	. . .	2.90	2.90	2.90	2.90	2.90
Perborate, drs, 400 lbs . . lb.	.14¾	.15¼	.14¾	.15¼	.14¾	.15¼
Peroxide, bbls, 400 lb . . lb.	. . .	.17	. . .	.17	. . .	.17
Phosphate, di-sodium, tech, 310 lb bbls, wks 100 lb.	. . .	2.05	. . .	2.05	. . .	2.05
bgs, wks . . . . . . 100 lb.	. . .	1.85	. . .	1.85	. . .	1.85
Tri-sodium, tech, 325 lb bbls, wks . . . . . . 100 lb.	. . .	2.20	. . .	2.20	. . .	2.20
bgs, wks . . . . . . 100 lb.	. . .	2.00	. . .	2.00	. . .	2.00
Picramate, 160 lb kgs . . lb.	.65	.67	.65	.67	.65	.67
Prussiate, Yellow, 350 lb bbl, wks . . . . lb.	.09½	.10	.09½	.10	.09	.11½
Pyrophosphate, anhyd, 100 lb bbls f.o.b. wks frt eq lb.	. . .	.0530	. . .	.0530	.0530	.10
Sesquisilicate, drs, c-l, wks . . . . 100 lb.	. . .	2.80	. . .	2.80	2.80	3.00
Silicate, 60°, 55 gal drs, wks . . . . 100 lb.	1.65	1.70	1.65	1.70	1.65	1.70
40°, 55 gal drs, wks 100 lb.	. . .	.80	. . .	.80	. . .	.80
tks, wks . . . . . . 100 lb.	. . .	.65	. . .	.65	. . .	.65
Silicofluoride, 450 lb bbls NY . . . . lb.	.03¾	.04	.03½	.04¾	.04¾	.06½
Stannate, 100 lb drs . . . lb.	.33½	.35	.30	.35	.25½	.34
Stearate, bbls . . . . lb.	.19	.24	.19	.24	.19	.24
Sulfanilate, 400 lb bbls lb.	.16	.18	.16	.18	.16	.18
Sulfate Anhyd, 550 lb bgs* c-l, wks . . . . 100 lb. ‡	1.45	1.90	1.45	1.90	1.45	1.90
Sulfide, 80% cryst, 440 lb bbls, wks . . . . lb.	. . .	.02¼	. . .	.02¼	. . .	.02¼
Solid, 650 lb drs, c-l, wks . . . . lb.	. . .	.03	. . .	.03	. . .	.03
Sulfite, cryst, 400 lb bbls, wks . . . . lb.	.023	.02½	.023	.02½	.023	.02½
Sulfocyanide, drs . . . . . lb.	.28	.47	.28	.47	.28	.47
Sulforicinoleate, bbls . . lb.	. . .	.12	. . .	.12	. . .	.12
Tungstate, tech, crys, kgs lb.	1.05	1.10	1.05	1.10	1.05	1.35
Sorbitol, com, solut, wks c-l, drs, wks . . . . lb.	. . .	.15½	. . .	.15½	.15½	.19
Spruce Extract, ord, tks . . lb.	. . .	.01⅛	. . .	.01⅛	. . .	.01⅛
Ordinary, bbls . . . . lb.	. . .	.01⅝	. . .	.01⅝	. . .	.01⅝
Super spruce ext, tks . . lb.	. . .	.01⅜	. . .	.01⅜	. . .	.01⅜
Super spruce ext, bbls . . lb.	. . .	.01⅞	. . .	.01⅞	. . .	.01⅞
Super spruce ext, powd, bgs . . . . lb.	. . .	.04	. . .	.04	. . .	.04
Starch, Pearl, 140 lb bgs 100 lb.	2.55	2.85	2.40	2.85	2.40	3.18
Powd, 140 lb bgs . . 100 lb.	2.65	2.85	2.50	2.90	2.50	3.28
Potato, 200 lb bgs . . . . . lb.	.04	.05	.04	.05	.03½	.05½
Imp, bgs . . . . lb.	.05	.06	.05	.06	.05	.06
Rice, 200 lb bbls . . . . . . lb.	.06¼	.07¼	.06¼	.07¼	.06¼	.07¼
Sweet Potato, 240 lb bbls, f.o.b. plant . . . . . . 100 lb.	7.25	7.50	7.25	7.50	. . .	. . .
Wheat, thick, bgs . . . . . lb.	.05	nom.	.05	.05½	.06¼	.07
Strontium carbonate, 600 lb bbls, wks . . . . lb.	.16½	.17½	.16½	.17½	.16½	.17
Nitrate, 600 lb bbls, NY lb.	.07¾	.08¼	.07¾	.08¼	.07¾	.09¼
Sucrose octa-acetate, den, grd, bbls, wks . . . . lb.	. . .	.45	. . .	.45	. . .	.45
tech, bbls, wks . . . . lb.	. . .	.40	. . .	.40	. . .	.40
Sulfur, crude, f.o.b. mines ton	. . .	16.00	. . .	16.00	16.00	19.00
Flour, coml, bgs . . . 100 lb.	1.65	2.35	1.65	2.35	1.65	2.35
bbls . . . . 100 lb.	1.95	2.70	1.95	2.70	1.95	2.70
Rubbermakers, bgs . . 100 lb.	2.20	2.80	2.20	2.80	2.20	2.80
bbls . . . . 100 lb.	2.55	3.15	2.55	3.15	2.55	3.15
Extra fine, bgs . . . . 100 lb.	2.85	3.00	2.85	3.00	2.85	3.00
Superfine, bgs . . . . . 100 lb.	2.65	2.80	2.65	2.80	2.65	2.80
bbls . . . . 100 lb.	2.25	3.10	2.25	3.10	2.25	3.10
Flowers, bgs . . . . . . 100 lb.	3.00	3.75	3.00	3.75	3.00	3.75
bbls . . . . 100 lb.	3.35	4.10	3.35	4.10	3.35	4.10
Roll, bgs . . . . 100 lb.	2.35	3.10	2.35	3.10	2.35	3.10
bbls . . . . 100 lb.	2.50	3.25	2.50	3.25	2.50	3.25
Sulfur Chloride, 700 lb drs, wks . . . . lb.	.03	.04	.03	.04	.03	.04
Sulfur Dioxide, 150 lb cyl lb.	.07	.09	.07	.09	.07	.09
Multiple units, wks . . . lb.	.04½	.07	.04½	.07	.04½	.07
tks, wks . . . . lb.	.04	.05	.04	.05	.04	.05
Refrigeration, cyl, wks lb.	.16	.17	.16	.17	.16	.17
Multiple units, wks . . . lb.	.07½	.10	.07½	.10	.07½	.10
Sulfuryl Chloride . . . . lb.	.15	.40	.15	.40	.15	.40
Sumac, Italian, grd . . . . . ton	. . .	66.00	65.50	67.00	62.00	68.00
Extract, 42°, bbls . . . . lb.	.05¼	.06¼	.05¼	.06¼	.05¼	.06¼
Superphosphate, 16% bulk, wks . . . . ton	. . .	8.00	. . .	8.00	8.00	9.00
Run of pile . . . . ton	. . .	7.50	. . .	7.50	7.50	8.50
Triple, 40-48%, a.p.a. bulk, wks, Balt. unit . . . . . ton	. . .	.70	. . .	.70	.70	.85
Talc, Crude, 100 lb bgs, NY ton	13.00	15.00	13.00	15.00	13.00	15.00
Ref'd, 100 lb bgs, NY ton	14.00	16.00	14.00	16.00	14.00	16.00
French, 220 lb bgs, NY ton	23.00	30.00	23.00	30.00	23.00	30.00
Ref'd, white, bgs, NY ton	45.00	60.00	45.00	60.00	45.00	60.00
Italian, 220 lb bgs to arr ton	60.00	62.00	60.00	62.00	60.00	62.00
Ref'd, white, bgs, NY ton	65.00	70.00	65.00	70.00	65.00	70.00
Tankage Grd, NY . . . unit ¤	. . .	2.75	2.75	3.25	2.50	3.15
Ungrd . . . . unit ¤	. . .	2.95	2.75	3.55	2.35	3.00
Fert grade, f.o.b. Chgo unit ¤	. . .	2.50	2.50	3.50	2.25	3.00
South American cif unit ¤	. . .	3.10	3.00	3.35	3.00	3.45
Tapioca Flour, high grade, bgs . . . . lb.	.02½	.04	.01¾	.05½	.02	.05½
Tar Acid Oil, 15%, drs . . gal.	.21	.23	.21	.24	.21	.25½
25%, drs . . . . gal.	.25	.27	.25	.28	.25	.29½
Tar, pine, delv, drs . . . . . gal.	.25	.26	.25	.26	. . .	.26
tks, delv, E. cities . . . . gal.	. . .	.20	. . .	.20	. . .	.20
Tartar Emetic, tech, bbls lb.	.27¾	.28	.27¾	.28	.26¾	.28
USP, bbls . . . . lb.	.33	.33½	.33	.33½	.32	.33½

‡ Bags 15c lower; ¤ + 10; * Bbls. are 20c higher.

	Current Market		1939 Low	1939 High	1938 Low	1938 High
Terpineol, den grade, drs lb.		.17		.17	. .	.17
Tetrachlorethane, 650 lb drs lb.	.08	.08½	.08	.08½	.08	.08½
Tetrachloroethylene, drs, tech lb.	. .	.09½	. . .	.09½	. . .	.09½
Tetralene, 50 gal drs, wks lb.	.12	.13	.12	.13	.12	.13
Thiocarbanilid, 170 lb bbls lb.	.20	.25	.20	.25	.20	.25
Tin, crystals, 500 lb bbls, wks lb.	. . .	.39	.35½	.39	.31	.36½
Metal, NY ....lb.	. . .	.49	.4520	.49	.3570	.4675
Oxide, 300 lb bbls, wks lb.	.52	.54	.50	.54	.44	.50
Tetrachloride, 100 lb drs, wks ....lb.	. . .	.24	.23	.24¾	.18½	.23½
Titanium Dioxide, 300 lb bbls lb.	.13¼	.16	.13¼	.16	.14½	.17
Barium Pigment, bbls . lb.	.05½	.06½	.05⅝	.06½	.05⅝	.06⅜
Calcium Pigment, bbls lb.	.05½	.06½	.05⅝	.06½	.05⅝	.06⅜
Toluidine, mixed, 900 lb drs, wks ....lb.	.26	.27	.26	.27	.26	.27
Toluol, 110 gal drs, wks . gal.	. . .	.27	. . .	.27	.27	.35
8000 gal tks, frt all'd . gal.	. . .	.22	. . .	.22	.22	.30
Toner Lithol, red, bbls . . lb.	.62	.67	.62	.80	.75	.80
Para, red, bbls ....lb.	.75	.80	.75	.80	.75	.80
Toluidine, bgs ....lb.	. . .	1.35	. . .	1.35	. . .	1.35
Triacetin, 50 gal drs, wks lb.	. . .	.36	. . .	.36	. . .	.36
Triamyl Borate, lcl, drs, wks lb.	. . .	.27	. . .	.27	. . .	.27
Triamylamine, c-l, drs, wks lb.	. . .	.77	.77	1.25	.77	1.25
lcl, wks, drs, ...lb.	. . .	.80	. . .	. . .	. . .	. . .
tks, wks, ...lb.	. . .	.75	. . .	. . .	. . .	. . .
Tributylamine, lcl, drs, wks lb.	. . .	.70	. . .	.70	. . .	.70
cl, drs, wks ....lb.	. . .	.67	. . .	. . .	. . .	. . .
tks, wks ....lb.	. . .	.65	. . .	. . .	. . .	. . .
Tributyl citrate, drs, frt all'd lb.	. . .	.45	. . .	.45	. . .	.45
Tributyl Phosphate, frt all'd lb.	. . .	.42	. . .	.42	.42	.50
Trichlorethylene, 600 lb drs, frt all'd E. Rocky Mts . lb.	.08	.08¾	.08	.09½	.089	.09½
Tricresyl phosphate, tech, drs lb.	.23	.37½	.23	.37½	.23	.39
Triethanolamine, 50 gal drs wks ....lb.	.21	.22	.21	.22	.21	.22
tks, wks ....lb.	. . .	.20	. . .	.20	. . .	.20
Triethylene glycol, drs, wks lb.	. . .	.26	. . .	.26	. . .	.26
Trihydroxyethylamine Oleate, bbls ....lb.	. . .	.30	. . .	.30	. . .	.30
Stearate, bbls ....lb.	. . .	.30	. . .	.30	. . .	.30
Trimethyl Phosphate, drs, lcl f.o.b. dest ....lb.	. . .	.50	. . .	.50	. . .	.50
Trimethylamine, c-l, drs, frt all'd E. Mississippi ....lb.	. . .	1.00	. . .	1.00	. . .	1.00
Triphenylguanidine ......lb.	.58	.60	.58	.60	.58	.60
Triphenyl Phosphate, drs . lb.	. . .	.38	. . .	.38	.34	.38
Tripoli, airfloated, bgs, wks ton	26.00	30.00	26.00	30.00	26.00	30.00
Turpentine (Spirits), c-l, NY dock, bbls ....gal.	. . .	.30**	.29	.35*	.26½	.31½
Savannah, bbls ....gal.	. . .	.24*	.23½	.29*	.20½	.30¾
Jacksonville, bbls .....gal.	. . .	.23¾*	.23½	.26¾	.20½	.30¾
Wood Steam dist, bbls, c-l, NY ....gal.	.27	.30	.242	.30	.242	.31
Wood, dest dist, c-l, drs, delv E. cities ......gal.	.23	.25	.22	.25	.22	.36
U						
Urea, pure, 112 lb cases . lb.	.14½	.15½	.14½	.15½	.14½	.15½
Fert grade, bgs, c.i.f. . ton						
c.i.f. S.A. points ....ton	95.00	110.00	95.00	110.00	95.00	110.00
Dom. f.o.b., wks ......ton	95.00	101.00	95.00	101.00	95.00	101.00
Urea Ammonia, liq., nitrogen basis .... ton	. . .	121.58	. . .	. . .	. . .	. . .
V						
Valonia beard, 42%, tannin bgs ....ton	. . .	45.00	45.00	47.00	45.00	52.00
Cups, 32% tannin, bgs . ton	27.00	29.00	27.00	31.00	30.00	37.50
Extract, powd, 63% . lb.	. .	.06	. . .	.06	. . .	.06
Vanillin, ex eugenol, 25 lb tins, 2000 lb lots ....lb.	. . .	2.60	2.20	2.60	2.10	3.10
Ex-guaiacol ....lb.	. . .	2.50	2.10	2.50	2.00	3.00
Ex-lignin ....lb	. . .	2.50	2.10	2.50	2.00	2.25
Vermilion, English, kgs . lb.	1.62	1.69	1.50	1.70	1.45	1.69
W						
Wattle Bark, bgs ....ton	34.50	38.00	34.50	38.50	36.00	41.75
Extract, 60°, tks, bbls . lb.	. .	.04	.04	.04⅜	.04⅜	.04⅝
WAXES						
Wax, Bayberry, bgs ... lb.	.27	.28	.16⅞	.28	.16⅞	.17
Bees, bleached, white 500 lb slabs, cases ......lb.	.33	.36	.33	.39	.35	.45
Yellow, African, bgs . lb	.19½	.20	.18½	.20	.19	.26
Brazilian, bgs .....lb.	.21½	.23½	.21	.23½	.22	.29
Chilean, bgs ......lb.	.21½	.23½	.21	.23½	.22	.29
Refined, 500 lb slabs, cases lb	.25½	.26	.25½	.33	.32	.39
Candelilla, bgs ....lb.	.15½	.16	.15¼	.16½	.13½	.16
Carnauba, No. 1, yellow, bgs ....lb.	.45	.46½	.36¾	.46½	.38	.44
No. 2, yellow, bgs ...lb.	.44	.45	.35¾	.45	.36	.42
No. 2, N. C., bgs ....lb.	.35	.35½	.34	.37	.34	.40
No. 3, Chalky, bgs ...lb.	.28½	.30	.27½	.31½	.29	.35½
No. 3, N. C., bgs ...lb.	.30	.31	.28¾	.32½	.30	.35½
Ceresin, dom, bgs .....lb.	.08½	.11½	.08½	.11½	.08½	.11½
Japan, 224 lb cases ....lb.	.13	.13½	.09¾	.13½	.09¼	.11
Montan, crude, bgs ....lb.	no prices		.11	.11¾	.11	.12⅛
Paraffin, see Paraffin Wax.						
Spermaceti, blocks, cases lb.	.18	.21	.18	.21	.22	.24
Cakes, cases ....lb.	.19	.22	.19	.22	.23	.25
Whiting, chalk, com 200 lb bgs c-l, wks ....ton	12.00	14.00	12.00	14.00	12.00	14.00
Gilders, bgs, c-l, wks . ton	. . .	15.00	. . .	15.00	. .	15.00
Wood Flour, c-l, bgs ...ton	20.00	30.00	20.00	30.00	20.00	33.00
Xylol, frt all'd, East 10° tks, wks ....gal.	. . .	.29	. . .	.29	.29	.33
Coml, tks, wks, frt all'd, gal.	. . .	.26	. . .	.26	.26	.30
Xylidine, mixed crude, drs lb.	.35	.36	.35	.36	.35	.36
Zinc Acetate, tech, bbls, lcl, delv ....lb.	.15	.16	.15	.21	. . .	.21
Arsenite, bgs, frt all'd lb.	.12	.12½	.12	.13	.12½	.13
Carbonate tech, bbls, NY lb.	.14	.15	.14	.15	.14	.15

*August 31. ** August 31.

Current

Zinc Chloride
Oil, Whale

	Current Market		1939 Low	1939 High	1938 Low	1938 High
Zinc (continued):						
Chloride fused, 600 lb drs, wks ... lb.	.04¼	.046	.04¼	.046	.04¼	.046
Gran, 500 lb drs, wks lb	.05	.05¾	.05	.05¾	.05	.05¾
Soln 50%, tks, wks 100 lb	...	2.25	...	2.25	.	2.25
Cyanide, 100 lb drs ... lb.	...	.33	...	.33	.33	.38
Dust, 500 lb bbls, c-l, delv lb.	...	.0675	.06½	.06¾	.06	.0740
Metal, high grade slabs, c-l, NY ... 100 lb.	...	5.15	4.84	5.15	4.35	5 45
E. St. Louis ..... 100 lb.	...	4.75	4.60	4.75	4.00	5 05
Oxide, Amer, bgs, wks ... lb.	.06¼	.07½	.06¼	.07½	.06	.07½
French 300 lb bbls, wks lb.	.06½	.07¾	.06½	.07¾	.06¼	.07¾
Palmitate, bbls ..... lb.	.23	.25	.23	.25	.23	.25
Resinate, fused, pale bbls lb.	...	.10	...	.10	..	.10
Stearate, 50 lb bbls ..... lb.	.20	.23	.20	.23	.20	.23
Zinc Sulfate, crys, 400 lb bbl, wks ..... lb.	...	.029	...	.029	.029	.033
Flake, bbls ..... lb.	...	.0325	.	.0325	.0325	.0375
Sulfide, 500 lb bbls, delv lb.	.07¾	.08	.07¾	.08⅞	.08⅝	.09¾
bgs, delv ..... lb.	.07½	.07¾	.07½	.08⅝	.08⅜	.09
Sulfocarbolate, 100 lb kgs lb.	.24	.26	.24	.26	.24	.26
Zirconium Oxide, crude, 73-75% grd, bbls, wks ..... ton	75.00	100.00	75.00	100.00	75.00	100.00

Oils and Fats

	Current Market		1939 Low	1939 High	1938 Low	1938 High
Babassu, tks, futures ... lb.	...	.05⅞	.05⅞	.06½	.06⅛	.06¾
Castor, No. 3, 400 lb drs lb.	.08¼	.09	.08¼	.10	.09¼	.10¾
Blown, 400 lb drs ... lb.	.10¼	.11	.10¼	.12	.11¼	.13
China Wood, drs, spot NY lb.	...	.23	.15	.23	.10¼	.15½
Tks, spot NY ..... lb.	.21	nom.	.14½	.21	.095	.15½
Coconut, edible, drs NY .. lb.	...	.08⅜	.08⅛	.08⅝	.08⅛	.09½
Manila, tks, NY ..... lb.	...	.02⅞	.02⅞	.03⅛	.03⅛	.04¼
Tks, Pacific Coast ... lb.	.02⅝	.02¾	.02⅝	.03	.02⅝	.03¾
Cod, Newfoundland, 50 gal bbls ..... gal.	...	.33	.29	.35	.35	.52
Copra, bgs, NY ..... lb.	...	.0160	.0160	.0180	.0170	.0235
Corn, crude, tks, mills ... lb.	.05⅛	.05¼	.05⅛	.06⅝	.06⅜	.08¼
Refd, 375 lb bbls, NY .. lb.	.07½	.07¾	.07½	.09¾	.09¼	.10½
Degras, American, 50 gal bbls NY ..... lb.	.07	.08	.07	.08	.07½	.08¼
English, bbls, NY ..... lb.	.07	.08	.07	.08	.07½	.08¼
Greases, Yellow ..... lb.	.03⅞	.04	.03⅞	.05⅛	.03½	.05½
White, choice, bbls, NY lb.	.04½	.04⅝	.04½	.06	.05	.07
Lard, Oil, edible, prime .. lb.	...	.09	.09	.10¼	.10¼	.12¾
Extra, bbls ..... lb.	...	.08	.08	.09⅜	.08¾	.10¾
Extra, No. 1, bbls ..... lb.	...	.07¾	.07¾	.09¼	.08⅝	.09¾
Linseed, Raw less than 5 bbl lots ..... lb	.092	.094	.092	.10	.089	.115
bbls, c-l, spot ..... lb.	.084	.086	.084	.093	.081	.102
Tks ..... lb.	.078	.082	.078	.087	.07½	.096
Menhaden, tks, Baltimore gal.	.21	nom.	.21	.32	.34½	.37½
Refined, alkali, drs ... lb.	...	.062	.062	.077	.067	.095
Tks ..... lb.	...	.056	.056	.071	.061	.087
Kettle bodied, drs ... lb.	...	.074	.074	.088	.076	.105
Light pressed, drs ..... lb.	...	.056	.056	.071	.061	.091
Tks ..... lb.	...	.05	.05	.065	.05½	.08
Neatsfoot, CT, 20°, bbls, NY lb.	...	.14¾	.14¾	.15¼	.15¼	.17¼
Extra, bbls, NY ..... lb.	...	.08	.08	.09¼	.08⅝	.10
Pure, bbls, NY ..... lb.	...	.11¾	.10¾	.12¼	.10¾	.12¼
Oiticica, bbls ..... lb	.17	.18	.09¼	.18	.09¼	.12¾
Oleo, No. 1, bbls, NY ... lb	...	.07¼	.07¼	.08¾	.08½	.10½
No. 2, bbls, NY ..... lb	...	.06¾	.06¾	.08	.08	.10
Olive, denat, bbls, NY .. gal.	...	.88	.82	.93	.86	1.20
Edible, bbls, NY ..... gal.	1.75	2.00	1.75	2.00	1.75	2.35
Foots, bbls, NY ..... lb.	...	.07½	.06¾	.07½	.07	.09⅞
Palm, Kernel, bulk ..... lb.	...	.0345	.0340	.036	.0325	.04½
Niger, cks ..... lb	.03⅝	.03¾	.03⅝	.03⅞	...	...
Sumatra, tks ..... lb	...	.0265	.0265	.02¾	.02⅝	.0375
Peanut, crude, bbls, NY .lb.	...	.06	.06	.07	.07	.08¼
Tks, f.o.b. mill ..... lb	...	.05¼	.05¼	.06⅝	.06⅝	.08
Refined, bbls, NY lb.	.08¾	.09	.08¾	.10	.09¾	.10¾
Perilla, drs, NY ..... lb	...	.12½	.09½	.12½	.09¾	.11¾
Tks, Coast ..... lb	...	.12	.089	.12	.09	.11
Pine, see Pine Oil, Chemical Section.						
Rapeseed, blown, bbls, NY lb.	.14	.14½	.14	.14½	.14	.14¾
Denatured, drs, NY .. gal	.81	.82	.80	.82	.75	.91
Red, Distilled, bbls ..... lb.	.06¾	.07¾	.06¾	.08¾	.07⅜	.10⅝
Tks ..... lb	...	.064	.064	.07½	.06½	.09¾
Sardine, Pac Coast, tks .. gal	...	.24	.24	.34	.28	.46½
Refined alkali, drs ..... lb.	...	.062	.062	.077	.067	.095
Tks ..... lb	...	.056	.056	.071	.061	.087
Light pressed, drs ..... lb.	...	.056	.056	.071	.061	.089
Tks ..... lb.	...	.05	.05	.065	.05½	.08
Sesame, yellow, dom ..... lb.	.09⅛	.09¼	.09	.10½	.10¼	.10½
White, dom ..... lb.	.09⅛	.09¼	.09	.10½	.10¼	.10½
Soy Bean, crude						
Dom, tks, f.o.b. mills . lb	.	.04½	.04½	.05¾	.05⅞	.07
Crude, drs, NY ..... lb	.05⅛	.05⅜	.05⅛	.065	.06½	.08
Ref'd, drs, NY ..... lb	.06⅜	.06⅝	.06⅜	.077	.07⅝	.097
Tks ..... lb	...	.05¾	.05¾	.0675	.0685	.082
Sperm, 38° CT, bleached bbls NY ..... lb.	.09	.092	.09	.10	.10	.102
45° CT, bleached, bbls, NY ..... lb.	.083	.085	.083	.093	.093	.095
Stearic Acid, double pressed dist bgs ..... lb.	.10	.11	.10	.11½	.10	.12
Double pressed saponified bgs ..... lb	.10¼	.11¼	.10¼	.11¾	.10¼	.12¼
Triple pressed dist bgs lb.	.12¾	.13¾	.12¾	.14½	.13	.15
Stearine, Oleo, bbls ..... lb.	.06	.06¼	.05½	.06¾	.05½	.08½
Tallow City, extra loose . lb.	...	.04⅜	.04⅜	.05⅜	.04¾	.06⅜
Edible, tierces ..... lb.	.04½	nom.	.04½	.06	.06	.07⅝
Acidless, tks, NY ..... lb	...	.07	.07	.08¼	.07¾	.09¼
Turkey Red, single, drs ... lb.	.06	.07	.06	.08⅝	.06¼	.08½
Double, bbls ..... lb	.08¾	.09¾	.08¾	.10⅞	.09½	.13
Whale:						
Winter bleach, bbls, NY lb.	.075	.077	.075	.083	.081	.10
Refined, nat, bbls, NY lb	.071	.073	.071	.079	.077	.096

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Index to Advertisers

Abernethy Co., John F. 350
American-British Chemical Supplies, Inc. 334
American Cyanamid & Chemical Corp. .....Pages 246 and 247
American Potash & Chemical Corp. 340

Baker Chemical Co., J. T. 311
Barrett Co. 336
Beacon Co. 342
Bemis Bro. Bag Co. 255
Bower Chemical Mfg. Co., Henry 343
Brookmire Corporation 350

Chemical Industries Exposition 302
Church & Dwight Co., Inc. 334
Chute, H. O. 349
Claflin, Alan A. 348
Columbia Alkali Corp. 285
Consolidated Products Co., Inc. 349

Diamond Alkali Co. 288
Doe & Ingalls, Inc. 348
Dow Chemical Co. 252
Dunkel & Co., Inc., Paul A. 344
du Pont de Nemours & Co., Inc., R. & H. Chemicals Department 248

Eastern Steel Barrel Corp. 345

Fergusson Co., Alex C. 348

General Ceramics Co. 281
General Chemical Co. ....Cover 3
General Dyestuff Corp. 351
Glickman, Charles S. 349
Gray & Co., William S. 350
Greeff & Co., R. W. 341

Harshaw Chemical Co. 332
Heyden Chemical Corp. 337
Hooker Electrochemical Co. 342
Howe & French, Inc. 348

Industrial Chemical Sales Division, West Virginia Pulp & Paper Co. 326
Innis, Speiden & Co. 305

Index to Advertisers

Jackson & Curtis 355
Jefferson Lake Oil Co., Inc. 340
Jungmann & Co. 342

King & Co., Inc., E. & F. 348

La Pine & Company, Arthur S. 348
Lavanburg Co., Inc., Fred L., Division of Reichhold Chemicals, Inc. 329
Luaces, E. L. 349

Mallinckrodt Chemical Works 312
Mann & Co., Inc., Geo. 348
Mathieson Alkali Works, Inc. 243
Mathieu & Co., A. H. 341
Monsanto Chemical Co. .... Cover 1
Mutual Chemical Co. of America, Inc. 245

National Aniline & Chemical Co., Inc. 282
National Carbon Company, Inc. 290
National Industrial Advertisers Association 346
Natural Products Refining Co. 256
Neuberg, Inc., William 343
Niacet Chemicals Corp. 330
Niagara Alkali Company 249

Oldbury Electro-Chemical Co. 339

Pacific Coast Borax Co. 338
Pennsylvania Coal Products Co. 344
Petrometer Corp. 343
Pfaltz & Bauer, Inc. 338
Pfizer & Co., Inc., Chas. 322
Philadelphia Quartz Co. 344
Polachek, Z. H. 349
Prior Chemical Corp. 306

R. & H. Chemicals Dept., E. I. du Pont de Nemours & Co., Inc. 248
Reichhold Chemicals, Inc. 329

Schuylkill Chemical Co. 348
Sharples Solvents Corp. 309
Slomon, Ira I. 349
Sobin Co., Inc., Irving M. 348
Solvay Sales Corporation .... Cover 2
Standard Silicate Division, Diamond Alkali Company 253
Starkweather Co., J. U. 348
Stauffer Chemical Co. 254
Stroock & Wittenberg Corporation 330

Tennessee Corp. 339
Texas Gulf Sulphur Co. 345
Turner & Co., Joseph 332

U. S. Industrial Chemicals, Inc. Insert facing pages 312 and 313
U. S. Potash Co. 345

Victor Chemical Works 287

Warner Chemical Co., Division Westvaco Chlorine Products Corp. 241
Wishnick-Tumpeer, Inc. .... Cover 4

"We"—Editorially Speaking

For the wisecrack of the month credit Walter S. Landis with "I'd rather be a Jew in Germany than a business man in the United States."

❖❖❖❖

Lloyd Van Doren tells the story of Amos Strange, the patent lawyer who selected his tombstone and had it inscribed: "Here lies an honest lawyer." His wife pointed out he hadn't mentioned his name and he would go unrecognized. Answered he: "No, my name isn't needed. Anyone reading the inscription will say: 'That's Strange.' "

❖❖❖❖

J. B. Hill, L. & N. R. R. President, told his employees in their house organ how much the minor supplies cost in terms of how many pounds of freight must be hauled one mile:

One typewriter	11,552 tons
One handlantern	201 tons
One lead pencil	1,187 lbs.
One letter head	542 lbs.

Why doesn't some watch dog of a chemical treasury do the same translation into terms of caustic, or chlorine, or sulfur black, or copper sulfate, or alum or what do you sell?

❖❖❖❖

In the same vein, Rohe Walter has figured that while the actual amount of goods sold by the average salesman is not greater than 30 years ago, the costs (salary and expenses) have doubled so that the average call now costs $7.78. Translating that into chemicals, would make some disconcerting reading.

❖❖❖❖

Vladimir Karapetoff, Consulting Engineer and Professor of Electrical Engineering at Cornell University, writing to the Editor of *Electric Engineering*, summarizes the discussions of papers presented at technical meetings thus:

1. Instructed by the boss to say that his company had developed practically an identical gadget long ago, but discontinued making it because of customers' complaints.

2. Condemns newfangled ideas in general and the paper by implication; says that the old things were not only fully sufficient, but actually better.

3. Says that his graduate students found the same result several years ago, but he did not deem it of sufficient importance to be published.

4. As one of the same gang, praises the paper and the author ex officio; "rubs in" a thing or two left out of the paper because of commercial reasons.

5. Tells a long story of how he and Edison once tried to solve an entirely different problem. A sufferer from an irresistible "it-reminds-me" disease.

6. Pedantically puts dots over the author's *i*'s.

7. Reads a few paragraphs of general irrelevant nature, to justify his traveling expenses.

8. The "smart alec" type: Repeats a part of the author's paper, in different and more obscure language, to show his learning.

9. Assumes a paternal attitude of an unappreciated pioneer, who at last sees his early struggles realized.

10. Shows lantern slides of a few mysterious curves on the screen, to indicate "us too."

11. Has nothing to say and says it with much zest: "Look, I'm here, aren't you glad to see me?

12. In an ingratiating way mentions the beautiful climate of Los Angeles.

"Garden O' Gods At Night"—*John J. Loughlin, waiter at the Chemists' Club (N. Y.) wins $25 first prize offered by Underwood & Underwood for photos at the N. Y. World's Fair. He did it with an 18-year old box camera!*

"Sometimes I Wonder About Dr. Talbot's Background."

Courtesy "The New Yorker" and Fritz Wilkinson

Fifteen Years Ago

(From our files of September, 1924)

American Viscose Co. opens its new Marcus Hook (Pa.) plant.

John McKesson, Jr., president, McKesson & Robbins, dies in his 85th year.

John F. Queeny, Monsanto president, addresses the convention of company's salesmen in St. Louis, reviewing Monsanto's early history.

Professor Charles E. Munroe is elected an honorary fellow by the American Institute of Chemists.

The Du Pont Co. introduces "Semesan" as an agricultural disinfectant and fungicide.

❖❖❖❖

Try this on your stenographer!—The average "poor working girl" spends four times as much for cosmetics as she does educational material and pays out $6.11 a month for creams, lotions, perfumes, lipstick, and beauty treatments. She works three weeks a year to pay for the taxes on her annual supply of these beauty aids.

❖❖❖❖

When that stout champion of the South, *The Manufacturer's Record*, seriously asks the question "Is cotton a necessity?" we get the full measure of what the Chemical Revolution means.

❖❖❖❖

That question is raised because world consumption of cotton dropped 91,000 bales last year and 2,076,000 bales the year before while world consumption of rayon roughly doubled during each year, and at no time in the past five years has the world's rayon supply been equal to the world's rayon demand.

Read these figures as a postscript to our own editorial in this issue on Wall Street's chemical valuations.

State of Chemical Trade

Current Statistics (Aug. 31, 1939) —p. 41

WEEKLY STATISTICS OF BUSINESS

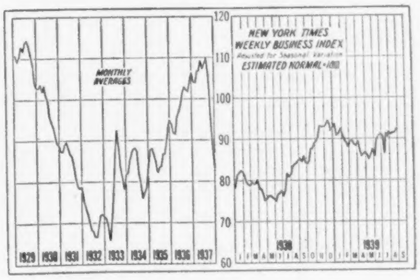
Week Ending	Carloadings 1939	Carloadings 1938	Carloadings % of Change	Electrical Output* 1939	Electrical Output* 1938	Electrical Output* % of Change	Jour. of Com. Price Index	Nat'l Fertilizer Ass'n Chem. & Drugs	Nat'l Fertilizer Ass'n Fats & Oils	Nat'l Fertilizer Ass'n Fert. Mat.	Price Indices Mixed Fert.	Price Indices All Groups	†Labor Dept. Chem. & Drug Price Index	% Steel Activity	N. Y. Times Index Bus. Act.	Fisher Commodity Index
July 29.....	659,764	588,697	+12.1	2,341,822	2,093,907	+11.8	74.7	91.9	45.7	68.4	77.2	71.2	74.6	59.3	91.2	127.2
Aug. 5.....	661,136	584,062	+13.2	2,325,085	2,115,847	+ 9.9	74.0	91.9	44.9	68.7	77.2	70.9	74.6	60.1	91.1	127.3
Aug. 12.....	665,197	589,568	+12.8	2,333,403	2,133,641	+ 9.4	73.7	91.9	43.3	68.7	77.2	70.3	74.3	62.1	91.3	128.0
Aug. 19.....	674,237	597,884	+12.8	2,367,646	2,138,517	+10.7	73.3	91.9	43.4	68.7	77.7	70.5	74.2	62.2	91.5	128.5
Aug. 26.....	688,591	620,557	+10.9	2,354,750	2,134,057	+10.3	74.5	91.9	44.7	68.7	77.7	71.1	74.2	63.0	92.3	128.0

*K.W.H., 000 omitted †1926-1928 = 100.0.

MONTHLY STATISTICS

CHEMICAL:	July 1939	July 1938	June 1939	June 1938	May 1939	May 1938
Acid, sulfuric (expressed as 50° Baumé, short tons, Bureau of the Census)						
Total prod. by fert. mfrs.	......	......	140,580	114,199	155,902	137,764
Consumpt. in mfr. fert.	......	......	106,137	102,228	108,889	119,218
Stocks end of month	......	......	80,394	83,289	90,137	87,120
Alcohol, Industrial (Bureau Internal Revenue)						
Ethyl alcohol prod., proof gal..	17,642,710	16,370,042	16,827,178	16,395,185	18,655,264	14,252,840
Comp. denat. prod., wine gal...	542,979	1,303,340	861,138	2,492,965	695,326	903,603
Removed, wine gal.	527,689	1,221,990	813,449	2,437,779	597,648	803,863
Stocks end of mo., wine gal...	670,229	779,849	655,994	699,772	608,807	645,192
Spec. denat. prod., wine gal. ...	6,893,739	5,407,077	7,304,529	5,376,531	7,795,113	5,188,803
Removed, wine gal.	6,867,719	5,419,830	7,130,302	5,374,308	7,605,163	5,268,570
Stocks end of mo., wine gal...	1,344,271	473,520	1,325,563	491,852	1,157,127	495,937
Ammonia sulfate prod., tons *a*..	46,526	30,482	42,253	27,967	33,064.5	32,002
Benzol prod., gal. *b*	8,028,000	4,769,000	7,292,000	4,413,000	5,546,000	4,905,000
Byproduct coke, prod., tons *a*..	3,364,799	2,176,612	3,089,721	2,066,530	2,396,435	2,282,621
Cellulose Plastic Products (Bureau of the Census)						
Nitrocellulose sheets, prod., lbs.	697,609	457,492	704,235	429,439	755,527	415,981
Sheets, ship., lbs.	600,701	523,072	703,764	542,265	626,647	503,539
Rods, prod., lbs.	226,630	142,715	188,714	145,197	221,139	212,167
Rods, ship., lbs.	199,282	162,200	240,930	130,974	259,152	192,875
Tubes, prod., lbs.	54,495	33,371	63,772	37,011	59,539	40,096
Tubes, ship., lbs.	46,844	45,722	55,159	48,814	54,017	58,610
Cellulose acetate, sheets, rod, tubes						
Production, lbs.	561,018	658,250	446,093	288,385	490,684	257,722
Shipments, lbs.	536,674	601,724	378,046	323,356	508,786	253,491
Molding comp., ship.; lbs. ...	604,476	303,327	702,854	414,692	704,085	434,598
Methanol (Bureau of the Census)						
Production, crude, gals.	......	......	343,992	293,091	354,413	330,875
Production, synthetic, gals.	......	......	1,295,288	1,629,570	1,778,581	1,860,000
Pyroxylin-Coated Textiles (Bureau of the Census)						
Light goods, ship., linear yds...	2,259,299	2,329,703	2,361,536	2,145,433	2,652,199	2,559,071
Heavy goods, ship., linear yds..	1,712,002	1,454,946	2,025,048	1,318,114	2,106,754	1,527,494
Pyroxylin spreads, lbs. *c*	4,350,562	3,882,270	4,710,415	3,341,135	4,726,511	4,128,819
Exports (Bureau of Foreign & Dom. Commerce)						
Chemicals and related prod. *d*..	......	......	$12,800,000	$12,200	$15,000	$13,204
Crude sulfur *d*	......	......	$941	$1,048	$600	$956
Coal-tar chemicals *d*	......	......	$1,388	$821	$1,088	$980
Industrial chemicals *d*	......	......	$2,401	$1,992	$2,467	$2,088
Imports						
Chemicals and related prod. *d*..	......	......	$5,300,000	$12,690	$15,000	$11,400
Coal-tar chemicals *d*	......	......	$819	$887	$1,062	$1,579
Industrial chemicals *d*	......	......	$1,449	$1,434	$2,524	$1,188
Payrolls (U. S. Dept. of Labor, 3 year av., 1923-25 = 100)						
Chemicals and allied prod., including petroleum	118.6	111.1	119.8	114.8	120.5	115.7
Other than petroleum	114.8	103.7	115.3	108.0	116.9	108.3
Chemicals	128.1	114.5	129.1	118.1	128.9	116.8
Explosives	98.1	89.4	96.3	80.2	91.8	83.2
Employment (U. S. Dept. of Labor, 3 year av., 1923-25 = 100)						
Chemicals and allied prod., including petroleum	109.6	105.0	109.2	105.2	111.6	108.8
Other than petroleum	106.8	101.0	106.7	101.4	110.3	105.9
Chemicals	115.0	107.8	114.5	109.7	114.5	109.6
Explosives	87.4	80.5	85.9	80.2	82.0	80.3
Price index chemicals	78.2	81.7	79.2	80.6	79.4	81.2
Chem. and drugs	75.0	77.7	75.7	76.3	75.9	76.8
Fert. mat.	67.5	66.9	69.5	69.5	69.7	69.6
FERTILIZER:						
Exports (long tons, Nat. Fert. Association)						
Fertilizer and fert. materials ...	154,800	112,944	136,016	99,717	148,095	127,496
Ammonium sulfate	3,008	1,526	2,298	1,131	5,156	146
Total phosphate rock	128,656	85,759	98,917	82,876	99,844	97,038
Total potash fertilizers	7,870	4,739	16,679	2,070	22,166	4,437
Imports (long tons, Nat. Fert. Association)						
Fertilizer and fert. materials ...	88,313	57,769	107,640	86,484	147,175	126,150
Ammonium sulfate	2,335	9,961	4,089	8,682	11,388	7,393
Sodium nitrate	18,479	8,969	59,332	55,063	62,010	73,025
Total potash fertilizer	41,234	19,414	16,425	6,403	10,415	1,669

INDUSTRIAL TRENDS



Business: August was marked by several very encouraging signs. Electric power output set an all-time high in the week ended Aug. 19. In the week following, carloadings were the heaviest of any week since the Fall of '37. The steel industry was operating at a 22-month peak, 63.5% of capacity, during the week ended Sept. 2. The generally solid condition of business has been proof against the effects of war, which have served mainly to unsettle the value of stocks. The industrial set-up is probably the strongest since the busy year of 1937, and probably will remain so for the balance of the year.

Steel: In the first 6 months of '39, iron and steel production was nearly double that in the like '38 period. 12,522,369 tons of pig iron and 18,590,780 of steel ingots were produced in the Jan.-June period of '39, as compared with 7,873,026 and 10,788,583 tons (respectively) in the like 6 months of '38. September schedules are expected to become heavier, as the auto industry gets under way with the 1940 line. Nearly all kinds of steel products show gains in the number of orders; steel-makers are optimistic as to the next few months, for they look for increased orders for rail goods, inasmuch as carloadings are likely to bring about the need for new rolling stock. The advent of war in Europe probably will make it necessary to revise still higher the estimates of production.

Automotive: July output of units, 209,-343, was about 32% less than in June, when 309,720 were turned out. August schedules were even lighter, although the seasonal low point has been passed by this time. September-October output will soar upwards, and that for the balance of the year is certain to bring the year's total production on a level with the 2,788,-

State of Chemical Trade
Current Statistics (Aug. 31, 1939) —p. 41

State of Chemical Trade

Current Statistics (Aug. 31, 1939)—p. 42

298 units of '37. In the Jan.-June period, over 1,953,500 cars were produced, a very substantial increase over the 1,203,343 made in the like '38 period.

Retail Trade: Sales were conservative in volume during the past month, perhaps due to the unseasonably hot weather prevailing in most parts of the country. Total volume of retail trade in the first six months of the year, $17,900,000,000, was 6% greater than in the corresponding half of '38, when sales were valued at about $16,900,000,000. Department store sales continued to show moderate gains, of from 3 to 9% during August, as compared with last August.

Commodity Prices: The outbreak of war is almost certain to raise commodity prices. N. Y. *Journal of Commerce* Price Index gained nearly 3 points during the week of Aug. 26-Sept. 2, rising from 74.5 to 77.4.

Textiles: Nearly all lines of goods are feeling the pressure of orders, some for 6 months in advance. Cotton, wool, silk, and rayon prices are expected to remain firm, in contrast to the panic that was experienced at the outbreak of war in 1914.

Rubber: Tire replacement sales fell off slightly from the June volume; in July, 4,160,319 casings were sold, as compared with June's 4,264,298. Crude rubber consumption in July, 43,880 tons, was about 8% less than in June, when 47,259 were taken.

Carloadings: In the week ended Aug. 26, 688,591 cars were moved—the largest number since the November weeks of '37.

Electric Energy: An all-time high of 2,367,646,000 kwh. was established in the week ended Aug. 19.

Outlook: Although markets are bound to be unsettled in the coming months, industry finds itself in an excellent position for the balance of the year. From all indications, there will be a very large increase in the volume of orders for heavy industrial goods, as well as for textiles and other consumer materials. The outbreak of war finds most stocks of industrial commodities in this country ready to meet sudden demands. At the moment there seems little likelihood that the severe decline in business activity which was experienced in 1914 will be repeated in the present situation. For one thing the fear of hostilities has now been present for many months, possibly not in an acute form, but present nevertheless, whereas 25 years ago the World War broke out at a time when the world in general was not expecting it. There are many uncertainties in the picture of course, chief of which is the possibility of the immediate repeal of the Neutrality Act.

MONTHLY STATISTICS (cont'd)

	July 1939	July 1938	June 1939	June 1938	May 1939	May 1938
FERTILIZER: (Cont'd)						
Superphosphate e (Nat. Fert. Association)						
Production, bulk	......	......	193,082	189,052	223,439	227,223
Shipments, total	......	......	78,904	80,940	532,795	410,067
Northern area	......	......	55,176	50,775	372,593	262,122
Southern area	......	......	23,728	30,165	160,202	147,945
Stocks, end of month, total	......	......	943,644	1,158,054	825,238	1,034,204
Tag Sales (short tons, Nat. Fert. Association)						
Total, 17 states	51,633	54,805	93,825	117,073	390,982	331,568
Total, 12 southern	47,915	38,101	86,192	116,361	312,313	275,761
Total, 5 midwest	3,718	16,704	7,633	712	78,669	55,807
Fertilizer payrolls	62.8	63.1	64.7	65.0	108.2	93.9
Fertilizer employment	65.0	64.0	70.4	69.0	113.2	100.1
Value imports, fert. and mat. *d*	......	......	$2,262	$1,885	$3,479	$2,880
GENERAL:						
Acceptances outst'd'g *f*	$236	$264	$245	$264	$246	$268
Coal prod., anthracite, tons	4,290,000	2,571,000	3,183,000	3,868,567	4,455,000	3,821,416
Coal prod., bituminous, tons	26,494,000	23,460,000	26,101,000	22,850,000	15,100,000	21,266,000
Com. paper outst'd'g *f*	$194	$210	$248	$253	$188	$251
Failures, Dun & Bradstreet	917	1,038	952	1,073	1,122	1,123
Factory payrolls *i*	83.8	70.6	85.9	70.8	84.4	72.9
Factory employment *i*	90.5	81.9	90.6	81.6	90.1	83.4
Merchandise imports *i*	$168,925	$140,836	$178,953	$145,869	$202,502	$148,248
Merchandise exports *i*	$229,628	$227,780	$236,058	$232,726	$249,259	$257,276
GENERAL MANUFACTURING:						
Automotive production	209,343	141,443	309,720	174,670	297,508	192,059
Boot and shoe prod., pairs	33,489,007	30,741,853	31,776,359	26,897,189	32,222,072	30,472,552
Bldg. contracts, Dodge *j*	$299,883	$239,799	$288,316	$251,006	$308,487	$223,156
Newsprint prod., U. S. tons	74,932	86,256	80,562	65,382	85,872	68,001
Newsprint prod., Canada, tons.	227,630	202,546	240,545	201,546	250,015	207,678
Glass Containers, gross‡	4,580	3,506	4,662	3,583	4,516	3,837
Plate glass prod., sq. ft.	6,212,209	5,505,768	9,288,788	5,956,386	8,035,832	3,866,052
Window glass prod., boxes	690,418	330,223	720,227	344,456	728,653	360,256
Steel ingot prod., tons	3,288,000	1,974,000	3,130,381	1,632,843	2,917,876	1,800,000
% steel capacity	61.9	33.42	53.44	28.36	48.24	29.75
Pig iron prod., tons	2,356,000	1,201,785	2,118,451	1,062,021	1,717,516	1,255,024
U.S. cons'pt. crude rub., lg. tons	43,880	32,209	47,259	30,629	44,337	30,753
Tire shipments	5,055,637	3,869,661	5,750,149	3,928,590	4,753,403	3,273,000
Tire production	4,510,122	3,286,864	4,869,862	3,036,012	4,418,072	2,987,000
Tire inventories	8,300,126	8,040,603	8,909,495	8,470,304	9,918,759	11,597,000
Cotton consumpt., bales	521,405	448,453	578,448	443,043	605,363	426,149
Cotton spindles oper.	21,915,362	21,915,394	21,788,286	21,142,408	21,975,222	21,341,846
Silk deliveries, bales	26,142	32,593	26,256	31,492	26,150	28,687
Wool Consumption *z*	30.1	23.5	32.9	21.7	29.8	16.6
Rayon deliv., lbs.	32,900,000	31,900,000	33,000,000	18,100,000	25,900,000	16,200,000
Hosiery (all kinds) *t*	......	......	8,694,258	7,562,160	9,111,996	7,065,107
Rayon employment *i*	313.7	270.5	303.6	265.4	308.5	283.8
Rayon payrolls *i*	311.3	249.5	301.8	242.1	298.3	257.9
Soap employment *i*	92.1	87.6	89.4	85.0	87.7	85.0
Soap payrolls *i*	94.7	87.1	93.5	85.9	90.3	86.0
Paper and pulp employment *i*	106.2	101.6	106.1	101.9	106.7	102.9
Paper and pulp payrolls *i*	101.4	96.9	104.4	94.9	105.5	97.2
Leather employment	93.2	89.3	88.1	81.8	86.6	86.0
Leather payrolls *i*	76.8	69.4	69.3	57.5	64.2	60.9
Glass employment *i*	90.0	74.7	93.0	79.3	91.5	80.7
Glass payrolls *i*	87.0	69.1	96.0	77.6	91.7	79.1
Rubber prod. employment *i*	78.7	68.7	80.2	70.6	81.2	71.4
Rubber prod. payrolls *i*	82.8	64.1	84.2	63.5	82.1	63.3
Dyeing and fin. employment *i*	109.1	97.0	106.4	98.0	112.9	101.9
Dyeing and fin. payrolls *i*	89.4	78.3	88.6	76.8	94.4	83.2
MISCELLANEOUS:						
Oils & Fats Index ('26 = 100)	......	......	53.7	60.2	54.5	60.6
Gasoline prod., bbls.	45,467	48,913	50,861	45,718	51,384	45,718
PAINT, VARNISH, LACQUER, FILLERS:						
Sales 680 establishments	$30,758,617	$27,946,084	$38,504,857	$33,936,706	$41,853,977	$36,827,421
Trade sales (580 establishments)	$17,215,946	$16,368,159	$22,341,180	$20,767,900	$25,436,932	$22,900,709
Industrial sales, total	$10,713,443	$8,806,128	$12,585,957	$9,763,856	$12,578,360	$10,135,607
Paint & Varnish, employ. *i*	117.1	110.8	119.3	113.0	118.4	114.9
Paint & Varnish, payrolls *i*	121.4	111.0	126.4	115.6	127.2	119.5

a Bureau of Mines; *b* Crude and refined plus motor benzol, Bureau of Mines; *c* Based on 1 lb. of gun cotton to 7 lbs. of solvent, making an 8-lb. jelly; *d* 000 omitted, Bureau of Foreign & Domestic Commerce; *e* Expressed in equivalent tons of 16% A.P.A.; *f* 000,000 omitted at end of month; *i* U. S. Dept. of Labor, 3 year average, 1923-25 = 100; *j* 000 omitted, 37 states; *p* Rayon Organon, formerly an index was given, now the exact poundage is given; *q* 680 establishments, Bureau of the Census; *r* Classified sales, 580 establishments, Bureau of the Census; *s* 53 manufacturers, Bureau of the Census; *t* 384 identical manufacturers, Bureau of the Census, quantity expressed in dozen pairs; *v* In thousands of bbls., Bureau of the Census; ** Indices, Survey of Current Business, U. S. Dept. of Commerce; *z* Units are millions of lbs.; ‡ 000 omitted.

Chemical Finances
August, 1939—p. 41

Price Trend of Representative Chemical Company Stocks

	July 31	Aug. 5	Aug. 12	Aug. 19	Aug. 26	Aug. 31	Net gain or loss last mo.	Price on Aug. 31, 1938	1939 High	1939 Low
Air Reduction	54¼	53⅞	53¼	51	52	49⅞	— 4⅜	60¾	65⅝	45¼
Allied Chemical	172	170¼	161	162	161½	160	—12	173¼	193	151½
Amer. Agric. Chem.	17¼	17	17¼	17	16⅛	16½	— ¾	22¼	24¼	16
Amer. Cyanamid "B"	27	27⅞	28	27¼	27⅞	26¾	— ¼	80¾*	28⅞	18⅜
Columbian Carbon	92	93	91	88	85	85	— 7	90	94	73
Commercial Solvents	11¼	11¼	10½	9¾	10	9⅞	— 1⅜	10	13¾	8⅝
Dow Chemical	124½	124½	123	125½	123	125	+ ½	129	135	101½
Du Pont	159¼	161	159¾	156	160	160	+ ¾	130⅝	164¼	126¼
Hercules Powder	72⅞	76	73	72	73⅞	74	+ 1⅛	62½	86	63
Mathieson Alkali	24⅝	23	21¼	21⅞	21	24½†	— ⅛	29¾*	36	20¾
Monsanto Chemical	103¼	103½	100½	98⅞	100½	100½	— 2¾	96¼*	111	85¾
Std. of N. J.	41¾	41	40⅝	39⅞	39⅞	40½	— 1¼	52¼	53¼	38
Texas Gulf Sulphur	29	29	27¾	28	28½	27⅝	— 1⅜	35	32⅝	26¼
Union Carbide	82½	82¾	78⅛	76⅜	80	78	— 4½	81⅝	90½	65½
U. S. Ind. Alcohol	17¾	17¾	15	15	15	16	— 1¾	21¾	25¾	13½

* Close Saturday, Aug. 26, 1939.
† Close Friday, Sept. 1, 1939.

Earnings Statements Summarized

Company:	Annual dividends	Net income 1939	Net income 1938	Common share earnings 1939	Common share earnings 1938	Surplus after dividends 1939	Surplus after dividends 1938
Columbian Carbon Co.:							
June 30 quarter	4.00	803,721	669,917	1.50	1.24	......	......
Six months, June 30	4.00	1,633,599	1,377,072	3.04	2.56	$558,787	$302,773
Eastman Kodak Co.:							
Twenty-four weeks, June 17	6.00	8,688,870	7,051,673	*h*3.43	*h*3.05	......	......
Interchemical Corp.:							
June 30 quarter	*f*	320,570	59,458	.77	*p*.90	......	......
Six months, June 30	*f*	639,284	71,253	1.53	*p*1.08	......	......
Twelve months, June 30	*f*	1,053,414	142,028	2.28	*p*2.15	......	......
National Oil Products Co.:							
Six months, June 30	*y* 1.00	308,242	164,014	1.71	.95	......	......
Pennsylvania Salt Mfg. Co.:							
Year, June 30	*y* 4.25	1,294,087	1,035,498	8.63	6.90	......	......
United Carbon Co.:							
June 30 quarter	3.00	381,659	374,685	.96	.94	......	......
Six months, June 30	3.00	840,861	813,049	2.11	2.04	......	......

f No common dividend; *h* on shares outstanding at close of respective periods; *y* amount paid or payable in 12 mos. to and including the payable date of the most recent dividend announcement; ** indicated quarterly earnings as shown by comparison of company's reports for first quarter of fiscal year and the six months period.

Dividends and Dates

Name	*Div.*	*Stock Record*	*Payable*
Atlas Powder Co.	50c	Aug. 31	Sept. 11
Colgate-Palmolive-Peet, pf., q.	$1.50	Sept. 5	Oct. 1
Columbian Carbon, q.	$1.00	Aug. 18	Sept. 11
Freeport Sulphur, q.	25c	Aug. 15	Sept. 1
Hercules Powder, pf., q.	$1.50	Aug. 4	Aug. 15
Heyden Chem. Corp.	40c	Aug. 22	Sept. 1
International Salt Co., q.	37½c	Sept. 15	Oct. 2
Johns-Manville	75c	Sept. 11	Sept. 25
Johns-Manville, pf., q.	$1.75	Sept. 14	Oct. 1
Lindsay Light & Chem., pf., q.	17½c	Sept. 2	Sept. 15
Liquid Carbonic, yr. end	20c	Sept. 11	Sept. 26
Liquid Carbonic	20c	Sept. 11	Sept. 26
Merck & Co.	25c	Sept. 20	Oct. 1
Merck & Co., 6% pf., q.	$1.50	Sept. 20	Oct. 1
National Lead	12½c	Sept. 15	Sept. 30
National Lead, pf. A, q.	$1.75	Sept. 1	Sept. 15
Paraffine Cos., Inc., q.	50c	Sept. 11	Sept. 27
Paraffine Cos., Inc., pf., q.	$1.00	Oct. 2	Oct. 16
Parker Rust-Proof, q.	25c	Aug. 10	Sept. 1
Procter & Gamble, 5% pf., q.	$1.25	Aug. 25	Sept. 15
Quaker Oats Co., q.	$1.25	Sept. 1	Sept. 25
Southern Phosphate Corp.	15c	Aug. 15	Sept. 1
Spencer, Kellogg & Sons	30c	Aug. 25	Sept. 11
Std. Whole's. Phos. & Acid Wks., q.	20c	Sept. 5	Sept. 15
Texas Gulf Sulphur, q.	50c	Sept. 1	Sept. 15
Tubize Chatillon, 7% pf., ac.	$1.75	Aug. 20	Sept. 1

(E) extra; (ac) accumulations.

Chemical Finances
August, 1939—p. 41

VOL. 45
Sept. '39

CHEMICAL INDUSTRIES

Statistical and Technical Data Section

NO. 3
Part 2

Chemical Finances
August, 1939—p. 42

Chemical Stocks and Bonds

Aug. 1939 Last	Aug. 1939 High	Aug. 1939 Low	1938 High	1938 Low	1937 High	1937 Low	Sales: Number of shares August 1939	Sales: Number of shares 1939	Stocks	Par $	Shares Listed	Dividends*	Earnings** $-per-share-$ 1938	1937	1936
NEW YORK STOCK EXCHANGE															
62	65	53	61	46¼	55	46	2,100	24,800	Abbott Labs.	No	640,000	$1.70	2.43	2.51	2.21
49⅞	65⅝	45¼	67⅞	40	80¼	44½	16,200	138,400	Air Reduction	No	2,563,992	1.50	1.47	2.86	2.79
160	193	151½	197	124	258½	145	10,200	75,900	Allied Chem & Dye	No	2,214,099	6.00	5.92	11.19	11.44
16½	24¼	16	28½	22	33¾	17⅞	1,400	32,900	Amer. Agric. Chem	No	627,987	1.43	2.23	2.95	1.57
6	11⅛	5⅝	15	9	30¾	8¼	2,800	37,400	Amer. Com. Alcohol	No	260,930	....	—2.05	3.23	4.55
27	29½	21	31½	20	46	22	2,400	15,200	Archer-Dan.-Midland	No	545,416	1.25	.43	5.03	3.05
50½	66¾	50	68	36	94	38	620	7,920	Atlas Powder Co.	No	249,163	2.25	2.69	4.40	4.21
120	127	116	126¼	105	133	101	310	1,880	5% conv. cum. pfd.	100	68,597	5.00	14.77	20.90	20.85
22½	29⅛	13⅝	26⅝	9	41¼	13	122,600	561,900	Celanese Corp. Amer.	No	1,000,000	....	.26	2.04	2.33
106	109⅞	84	96	82	115	90	2,280	10,480	prior pfd.	100	164,818	7.00	15.05	27.07	27.25
14⅛	17¼	11½	17	7⅛	25¾	8½	46,400	407,800	Colgate-Palm.-Peet	No	1,962,087	.25	1.77	—.35	1.40
103⅞	107	101⅞	104¼	78	104½	95	600	9,700	6% pfd.	100	233,098	6.00	21.12	3.21	17.13
87	94	73	98½	53¾	125¾	65	2,100	24,800	Columbian Carbon	No	537,406	4.00	5.13	8.31	7.48
9⅞	13¾	8⅝	12¼	5⅞	21¼	5	38,000	788,700	Commercial Solvents	No	2,636,878	....	—.11	.60	.85
58	66⅞	54⅞	70¾	53	71¼	50½	12,700	120,900	Corn Products	25	2,530,000	3.00	3.18	2.52	3.86
173¾	177	165	177	162	171½	153	300	5,000	7% cum. pfd.	100	245,738	7.00	39.69	32.96	46.76
20	32⅜	18⅛	40⅞	25	76⅛	29½	1,270	13,450	Devoe & Rayn. A.	No	95,000	2.00	—1.72	4.05	4.49
127	135	101½	141	87⅞	159¼	79½	3,100	41,400	Dow Chemical	No	945,000	3.00	3.91	4.15	4.48
160	164¼	126¼	154¾	90½	180⅛	98	36,800	331,100	DuPont de Nemours	20	11,065,762	3.25	3.74	7.37	7.54
124	124⅛	117½	120½	109½	112	107½	500	8,800	4½% pfd.	No	500,000	4.50	87.27	165.48	......
131¾	142	129½	138½	130¾	135½	130	4,000	29,100	6% cum. deb.	100	1,092,948	6.00	45.92	81.70	84.21
166	186⅛	138⅛	187	121½	198	144	15,200	185,700	Eastman Kodak	No	2,250,921	6.50	7.54	9.76	8.23
176	183½	173	173	157	164	150	90	1,930	6% cum.	100	61,657	6.00	281.22	362.45	306,64
20¼	30	18¼	32	19⅞	32¼	18	4,700	78,500	Freeport Texas	10	796,380	2.00	1.87	3.30	2.43
8	10⅞	7	12⅛	6¾	19	8½	3,000	70,200	Gen. Printing Ink	1	735,960	.50	.62	1.32	1.32
15¾	24½	14	28½	13	51½	19⅛	6,900	89,500	Glidden Co.	No	829,989	.50	—.29	2.62	3.29
39	47	34	51½	37	58⅛	43	100	4,900	4½% cum. pfd.	50	199,940	2.25	1.03	12.72	15.43
107	110¼	93	111	76¾	117½	80⅛	2,100	13,200	Hazel Atlas	25	434,409	5.00	4.97	6.67	6.55
74	86	63	87	42¾	92½	50	8,500	70,600	Hercules Powder	No	1,316,710	1.50	1.95	2.97	3.24
133⅜	135½	128½	135¼	126¾	135½	125	580	4,440	6% cum. pfd.	100	96,194	6.00	35.31	50.75	48.97
22⅜	29½	16¾	30⅜	14⅜	47½	15	11,100	244,700	Industrial Rayon	No	759,325	.25	.24	.34	2.24
31	36¼	17½	34½	15	64¼	20	13,000	52,800	Interchem.	No	289,618	....	.32	1.44	3.02
106	108	90	98	80	111½	92	360	4,610	6% pfd.	100	65,661	6.00	7.39	12.26	18.97
1½	3⅛	1½	3⅞	2	9⅛	2	2,000	28,400	Intern. Agricul.	No	436,048	....	....	.16	—1.55
18½	27⅝	16	29	15	63½	18¼	200	6,200	7% cum. pfd.	100	100,000	2.00	7.01	7.70	.23
46	55¾	42¾	57⅝	36⅞	73⅜	37	85,100	829,000	Intern. Nickel	No	14,584,025	2.00	2.09	3.31	2.40
31½	34	29	30¼	19½	28¾	19⅛	1,300	13,200	Intern. Salt	No	240,000	2.00	2.29	2.11	1.70
16½	21½	14½	24	19⅛	36	19¼	700	7,500	Kellogg (Spencer)	No	509,213	1.40	.71	2.81	2.62
45¾	56¾	36½	58⅜	23¼	79	33⅝	17,100	170,200	Libbey Owens Ford	No	2,509,750	1.25	1.57	4.19	4.14
15½	19	13½	21½	12⅛	26⅞	14	7,000	56,800	Liquid Carbonic	No	700,000	1.25	1.81	2.37	1.58
21½	36	20¾	36⅞	19¾	41¾	22	9,100	59,700	Mathieson Alkali	No	828,171	1.50	1.01	1.81	1.76
100½	111	85¾	110	67	107½	71	8,600	77,300	Monsanto Chem.	No	1,241,816	2.00	2.35	4.40	4.01
118½	121	115	117½	111	109	105	840	2,920	4½% pfd. A	No	50,000	4.50	31.51	49.99	......
117	122½	117	...	...	...	...	300	6,960	4½% pfd. B	No	50,000	4.50	31.51	49.99	......
19½	27½	17⅞	31	17⅛	44	18	22,500	245,400	National Lead	10	3,095,100	.50	.75	.95	1.71
170	173⅛	165	178½	154	171	153	600	4,300	7% cum. "A" pfd.	100	213,793	7.00	26.03	22.86	33.83
143½	145	135	145½	127	150	127	440	5,070	6% cum. "B" pfd.	100	103,277	6.00	35.97	43.77	74.50
9½	17⅛	8½	19½	9⅞	41¾	10⅛	21,400	221,800	Newport Industries	1	621,359	....	—.08	2.22	.99
63	70	50	76¼	40	103¾	51¼	15,400	127,800	Owens-Illinois Glass	12.50	2,661,204	1.50	2.02	3.51	3.80
59¼	64	50⅝	59	39½	65½	43¼	21,400	165,100	Procter & Gamble	No	6,325,087	2.00	2.59	4.08	2.39
114	119¾	112	122¼	114	118½	114½	580	12,770	5% pfd.	100	169,517	5.00	101.81	157.05	94.14
10¼	15⅛	9⅞	18⅜	10	34¾	14⅞	9,500	121,500	Shell Union Oil	No	13,070,625	.70	.70	1.44	1.35
98½	107	98½	106½	93	105⅜	91	2,700	16,100	5½% cum. pfd.	100	341,000	5.50	33.18	60.59	57.20
17	29½	15½	34¾	18½	60⅝	26½	11,200	61,200	Skelly Oil	No	995,349	1.00	2.27	6.07	4.42
94½	96½	92	98	84	102¼	88	500	4,000	6% cum. pfd.	100	64,500	6.00	41.09	97.86	73.16
24⅛	29⅛	22¾	35⅛	24¾	50	26⅛	40,900	352,300	S. O. Indiana	25	15,272,020	1.00	1.82	3.16	3.09
40½	53¼	38	58⅜	39¾	76	42	100,800	635,100	S. O. New Jersey	25	26,618,065	1.50	2.86	5.64	3.73
5¼	6½	4	8	3⅞	15⅜	5¼	6,000	81,100	Tenn. Corp.	5	853,696	....	.46	1.09	.41
36½	48¼	32½	49⅝	37⅝	65⅛	34¾	72,200	534,900	Texas Corp.	25	10,876,882	2.00	2.13	5.02	4.10
27⅝	32⅝	26¼	38	26	44	23¾	10,100	139,200	Texas Gulf Sulphur	No	3,840,000	2.00	1.81	3.02	2.57
78	90½	65½	90⅞	57	111	61¼	43,500	399,000	Union Carbide & Carbon	No	9,073,288	2.40	2.77	4.81	4.09
60	65¾	52	73½	39	91	36¾	2,800	30,300	United Carbon	No	397,885	3.25	3.78	5.91	5.54
16	25¾	13½	30¼	13½	43⅝	16⅛	4,100	65,500	U. S. Indus. Alcohol	No	391,238	....	—1.08	1.24	—.20
21	30¼	16	28⅞	11½	39⅜	9¼	31,800	211,600	Vanadium Corp. Amer.	No	376,637	....	.61	2.22	.40
22	25⅞	18¼	25¼	13½	...	...	4,100	50,200	Victor Chem.	5	696,000	.90	1.05	1.01	1.16
2½	4⅞	2½	5⅜	2¾	12¾	2⅛	3,000	52,900	Virginia-Caro. Chem.	No	486,122	....	—1.80	—.05	—2.44
20¼	31⅞	17	32⅛	15¾	74⅜	18½	3,100	39,100	6% cum. part. pfd.	100	213,052	....	1.90	5.88	.44
23½	26	15¼	20⅛	10	27¼	10¾	6,000	32,100	Westvaco Chlorine	No	339,362	1.00	1.52	1.46	1.17
33⅝	34¾	29	31½	20	34⅞	21⅛	2,400	14,000	cum. pfd.	30	192,000	1.50	4.19	4.09	3.26
NEW YORK CURB EXCHANGE															
26¾	28⅞	18⅜	30¼	15½	37	17⅝	40,100	248,500	Amer. Cyanamid "B"	10	2,520,368	.45	.91	2.09	1.77
106	110	76	92	50	124	69	2,725	9,560	Celanese, 7% cum. 1st pfd.	100	148,179	8.53	8.95	22.32	24.47
3⅛	5¼	3	6¾	3	15	3	500	4,425	Celluloid Corp.	15	194,952	....	—2.73	—.92	—.80
6⅜	7⅜	4¾	12	6½	14⅝	10½	500	3,000	Courtauld's Ltd.	£1	24,000,000	.29	.26%	8.64%	8.30%
5½	7	5	9⅞	6	10⅜	3½	700	7,700	Duval Texas Sulphur	No	500,000	....	.71	.43	.61
38½	41½	30	41¼	27	47½	31	200	4,000	Heyden Chem. Corp.	100	149,643	1.50	2.07	3.94	3.56
103	117	90	115½	55	147½	77	3,200	41,700	Pittsburgh Plate Glass	25	2,142,443	1.75	3.00	8.53	7.15
83	113¼	81	117¾	66	154¾	72¼	3,400	27,800	Sherwin Williams	25	638,927	2.50	2.43	8.76	8.04
110	115¾	107½	114⅛	107	114	106¼	380	1,810	5% cum. pfd.	50	132,189	5.00	8.76	45.50	41.44
PHILADELPHIA STOCK EXCHANGE															
142½	167	135	167	121½	179	115	225	1,475	Pennsylvania Salt	50	150,000	4.50	6.90	11.79	8.57

Aug. 1939 Last	Aug. 1939 High	Aug. 1939 Low	1938 High	1938 Low	1937 High	1937 Low	Sales August 1939	Sales 1939	Bonds	Date Due	Int. %	Int. Period	Outstanding $
NEW YORK STOCK EXCHANGE													
102¼	103½	100¾	105⅛	99⅛	109½	99	151,000	2,033,000	Amer. I. G. Chem. Conv.	1949	5½	M-N	$25,300,000
27	28½	19	38	25⅛	42½	23	122,000	571,000	Anglo Chilean Nitrate inc. deb.	1967	4½-5	J	12,067,000
106⅛	108⅜	104	106⅛	102⅛	102⅞	100⅛	35,000	212,000	Dow Chemical	1951	3	J-D	5,000,000
103⅛	103½	99⅞	102¾	100	102	98½	8,000	170,000	Int. Agric. Corp. 1st Coll. tr. stpd. to 1942	1942	5	M-N	5,633,000
26	27½	21½	35⅛	24¾	35⅛	21¼	114,000	1,049,000	Lautaro Nitrate inc. deb.	1975	4	J-D	30,500,000
30	30	26	35⅛	24¾	25½	20½	3,000	7,000	Ruhr Chem.	1948	6	A-D	1,500,000
102	105	102	104⅛	90¼	102¾	94	56,000	583,000	Skelly Oil	1951	4	J-J	9,000,000
103¼	106¼	102½	105⅛	100	102	95	168,000	2,850,000	Standard Oil Co. (New Jersey) deb.	1961	3	J-D	85,000,000
103¼	106½	101	103	98	...	...	243,000	2,077,000	Standard Oil Co. (New Jersey) deb.	1953	2¾	J-J	50,000,000
105	108⅝	104	103	95	105	93½	182,000	2,766,000	Texas Corp.	1951	3½	J-D	60,000,000
103	105½	101¼	...	...	...	...	604,000	1,625,000	Texas Corp.	1959	3	A-O	40,000,000
101	103½	96	101	77	111	81	29,000	383,000	Vanadium Corp. conv.	1941	5	A-O	2,800,000

* Paid in 1938, including extras but excluding dividends paid in stock. ** For either fiscal or calendar year.

Coke Production in 1938

Preliminary statistics of the coke industry in 1938, compiled by the Bureau of Mines, are given in the various tables on this and the following pages. Compilations were made by H. L. Bennit and M. F. Cooke, Coal Economics Division, under the direction of M. van Siclen, chief engineer. Generally speaking, the tables reproduced have been curtailed, or otherwise revised, in order to deal mostly with the chemical byproducts of the coking industry, rather than with the coke and coal aspects.

Byproduct coke production in '38 was severely limited, by comparison with the previous year, largely due to the sluggish activity of the steel industry, where production of coke fell to 42.8% of the '37 level. The '38 output of byproduct coke, 31,795,892 tons, was 35.4% under the '37 yield of 49,210,800 tons. Production in the current year, however, is running far ahead of last year's schedules, for over 21,648,000 tons were produced in the first 7 months.

Activity in the coke industry in 1938 reached its peak in December, representing the 6th consecutive advance over a preceding month. The advances in production, however, were relatively small, the trend still remaining well below that during 1937.

Statistical Summary of the Coke Industry, 1937-38

		1938	1937	% Decrease 1938 from 1937
Byproduct coke produced:				
At merchant plants	net tons	11,116,801	13,076,539	15%
At furnace plants	net tons	20,679,091	36,134,209	43
Total	net tons	31,795,892	49,210,748	39
Byproducts produced:				
Gas	M cu. ft.	489,600,000	757,628,942	35
Tar	gals.	389,500,000	603,053,288	36
Ammonium sulfate	lbs.	873,405,000	1,506,431,251*	....
Ammonia liquor (NH_3 Content)	lbs.	44,025,000	....	....
Crude light oil	gals.	120,800,000	187,054,346	35
Naphthalene	lbs.	39,400,000	115,979,238	66
Benzol[1]	gals.	71,362,000	117,187,217	65

[1] Includes crude and refined, as well as motor, benzol. * Represents ammonium sulfate or equivalent. Beginning with January, 1938, coke producers have reported to the Bureau of Mines current monthly figures for sulfate of ammonia and ammonia liquor.

Byproduct Coke Produced in the U. S., 1938-'37, By Months

	Furnace plants	Merchant plants	Total 1938	Total 1937	% of change '38 from '37
Monthly production:					
Jan.	1,711,649	1,050,825	2,762,474	4,360,700	—42.5
Feb.	1,544,833	948,753	2,493,586	3,992,900	—39.9
Mar.	1,673,071	1,002,000	2,675,071	4,495,500	—31.3
Apr.	1,949,540	941,724	2,436,264	4,350,900	—39.9
May	1,375,450	907,171	2,282,621	4,479,700	—49.0
June	1,224,988	841,542	2,066,530	4,024,800	—40.9
July	1,351,302	825,310	2,176,612	4,423,900	—50.8
Aug.	1,646,637	847,834	2,494,471	4,573,400	—45.5
Sept.	1,798,849	876,240	2,675,089	4,427,800	—39.6
Oct.	2,138,974	953,832	3,092,806	4,035,100	—23.1
Nov.	2,339,380	938,143	3,277,523	3,222,300	
Dec.	2,379,418	983,427	3,362,845	2,823,800	+16.3
Total	20,679,091	11,116,801	31,795,892	49,210,800	—33.5 (Av.)
Average daily production:					
Jan.	55,214	33,898	89,112	140,668	—35.7
Feb.	55,173	33,884	89,057	142,604	—37.1
Mar.	53,970	32,323	86,293	145,016	—40.5
Apr.	49,818	31,391	81,209	145,030	—43.9
May	44,369	29,264	73,633	144,506	—48.9
June	40,833	28,051	68,884	134,160	—48.7
July	43,590	26,623	70,213	142,706	—57.0
Aug.	53,117	27,349	80,467	142,529	—43.6
Sept.	59,962	29,208	89,170	147,593	—39.9
Oct.	68,999	30,769	99,768	130,165	—23.4
Nov.	77,979	31,271	109,251	107,410	+ 1.7
Dec.	76,755	31,723	108,479	91,090	+19.1
Av.	56,655	30,457	87,112	134,824	—33.2

Price Structure Weak

Most prominent features of the '38 coke industry were the marked declines in the output of naphthalene and benzol. Only 39,300,00 lbs. of naphthalene were produced last year, barely more than one-third of the record '37 yield of 115,979,238 lbs. The volume of benzol, 71,362,000 gals., fell to less than half of '37's output, 117,187,217 gals. Other coal-tar chemicals also diminished in output. The principal consumers of these products, namely coatings manufacturers, and rubber processors, and plastics producers, took considerably less of these materials during the dull industrial year; nevertheless, stocks of most of the various coal-tar crudes remained at a low level that caused concern for some time during the early months of '38. In April, '38, a ½c reduction in the price of refined naphthalene (from 7¼c to 6¾c) occurred just as the active selling season was getting under way. This change stood in direct contrast with the firm state of prices which existed in the early part of the previous year. Two reasons contributed to this demonstration of weakness: first, the greatly increased volume of available crude naphthalene (both domestic and imported); second, the generally poor state of business then prevalent. In May, sharp price reductions followed for toluol, xylol, and solvent naphtha. These declines came to 15-25% of the previous levels. In this same month, keen competition between imported and domestic cresylic acids forced down their prices by 5-10%. Imported crude naphthalene prices came down as much as 10-15% in this first half of the year. At the end of June, solvent naphtha was quoted at 26c, as compared with 31c in January; toluol at 22c, as compared with 30c in January; likewise, xylol at 26c, as against 30c; cresylic acid (high-boil.) at 73c, as against 89c, and the low-boiling cresylic at 78c, as compared with 92c. Benzol prices were noteworthy, in that the demand-supply situation allowed its quotations to vary but little from 16c. The over-all average price for benzol has been almost constant during the last 3 years. In the adjacent table are presented first-of-the-year quotations for a dozen leading coal-tar chemicals.

Comparison of these prices with those that are current in this Fall of '39 should prove to be of interest. Despite increased plant facilities for the production of coal-tar products, the demand for war materials will send the markets for these "necessities" soaring.

Price Comparison of Important Coal-Tar Chemicals, Jan. 1, '37-Jan. 1, '39

Product	Jan. 1 1937	Jan. 1 1938	Jan. 1 1939
Acid Cresylic,			
High boil.	$0.72	$0.89	$0.63
Low boil	0.77	0.92	0.69
Benzol, tanks	0.16	0.16	0.16
Cresol, U.S.P.	0.10	0.12½	0.10
Creosote oil,			
Grade 1, tks.	0.13	0.13½	0.13½
Grade 2, tks.	0.113	0.122	0.122
Naphthalene,			
Crude, dom.	2.75	2.60	2.25
Ref'd.	0.07¼	0.07¼	0.05¾
Orthodichlorobenzene, drs.	0.05	0.06	0.06
Paradichlorobenzene, drs.	0.16	0.11	0.11
Phenol, drs.	0.13¼	0.14½	0.14½
Solvent Naphtha, tks.	0.31	0.31	0.26
Tar Acid Oil, 15%	0.21	0.22½	0.21
25%	0.24½	0.26½	0.25
Toluol, tks.	0.30	0.30	0.22
Xylol, tks.	0.30	0.30	0.26

Coke Production Data, 1938, p. 5

Coke Production Data, 1938, p. 6

STATISTICAL SUMMARY OF MONTHLY DEVELOPMENTS IN THE COKE INDUSTRY—1938

(Pig iron in gross tons; coke, coal, and ammonia, net tons; benzol, gallons)

Coke production:	January	February	March	April	May	June	July	August	September	October	November	December	Total 1938	Change from last year (%)	Total 1937
Byproduct:															
Furnace plants—															
Monthly tonnage .....tons	1,711,649	1,544,833	1,673,071	1,494,540	1,375,450	1,224,988	1,351,302	1,646,637	1,798,849	2,138,974	2,339,380	2,379,418	20,679,091	—42.8%	36,134,200
Daily average	55,214	55,173	53,970	49,818	44,369	40,833	43,590	53,117	59,962	68,999	77,979	76,755	56,655	—42.8	98,998
Merchant plants—															
Monthly tonnage	1,050,825	948,753	1,002,000	941,724	907,171	841,542	825,310	847,834	876,240	953,832	938,143	983,427	11,116,801	—15.0	13,076,600
Daily average	33,898	33,884	32,323	31,391	29,264	28,051	26,623	27,349	29,208	30,769	31,271	31,723	30,457	—15.0	35,826
Total byproduct—															
Monthly tonnage	2,762,474	2,493,586	2,675,071	2,436,264	2,282,621	2,066,530	2,176,612	2,494,471	2,675,089	3,092,806	3,277,523	3,362,845	31,795,892	—35.4	49,210,800
Daily average	89,112	89,057	86,293	81,209	73,633	68,884	70,213	80,467	89,170	99,768	109,251	108,479	87,112	—35.4	134,824
Percent of capacity	52.4%	52.3%	50.7%	47.7%	43.2%	40.4%	41.3%	47.3%	52.4%	57.9%	63.3%	62.8%	51.0%	—35.3	78.8%
Beehive: Monthly tonnage....	117,100	104,600	97,300	74,700	58,400	51,800	43,600	50,100	55,700	63,300	70,200	78,700	865,500	—72.7	3,164,700
Daily average	4,504	4,358	3,604	2,873	2,246	1,992	1,744	1,856	2,142	2,435	2,700	3,027	2,783	—72.7	10,176
Total coke—															
Monthly tonnage	2,879,574	2,598,186	2,772,371	2,510,964	2,341,021	2,118,330	2,220,212	2,544,571	2,730,789	3,156,106	3,347,723	3,441,545	32,661,392	—37.6	52,375,500
Daily average	93,616	93,415	89,897	84,082	75,879	70,876	71,957	82,323	91,312	102,203	111,951	111,506	89,895	—38.0	145,000
Stocks of coke at byproduct plants—end of month:															
Furnace plants	1,086,980	1,195,691	1,305,298	1,347,919	1,375,558	1,411,437	1,460,435	1,453,007	1,391,947	1,333,895	1,306,719	1,290,620	1,290,620	+23.6	1,044,489
Merchant plants	1,279,690	1,278,773	1,471,772	1,785,929	1,899,317	1,963,565	2,103,738	2,255,990	2,282,596	2,382,003	2,438,396	2,319,074	2,319,074	+57.2	1,474,831
Total	2,366,670	2,474,464	2,777,070	3,133,848	3,274,875	3,375,002	3,564,173	3,708,997	3,674,543	3,715,898	3,745,115	3,609,694	3,609,694	+43.3	2,519,320
Benzol production ....gals.	6,155,000	5,575,000	5,998,000	5,385,000	4,905,000	4,413,000	4,769,000	5,585,000	6,056,000	7,100,000	7,619,000	7,802,000	71,362,000	—39.0	117,014,000
Ammonia production:															
Ammonium sulfate	75,469,000	66,963,000	73,167,000	68,684,000	64,004,000	55,934,000	60,964,000	69,682,000	72,805,000	84,089,000	89,970,000	91,674,000	873,405,000	—32.3	1,289,740,739
Ammonia liquor (NH_3 content)	3,655,000	3,371,000	3,804,000	3,480,000	3,263,000	3,179,000	3,016,000	3,638,000	3,797,000	4,279,000	4,180,000	4,363,000	44,025,000	—18.7	54,172,628
Prices, byproducts:															
Sulfate of ammonia	$1.48	$1.48	$1.48	$1.48	$1.48	$1.48	$1.44	$1.33	$1.35	$1.36	$1.38	$1.39	$1.43	+ 2.1	$1.40
Benzol	$0.16	$0.16	$0.16	$0.16	$0.16	$0.16	$0.16	$0.16	$0.16	$0.16	$0.16	$0.16	$0.16	0.0	$0.16

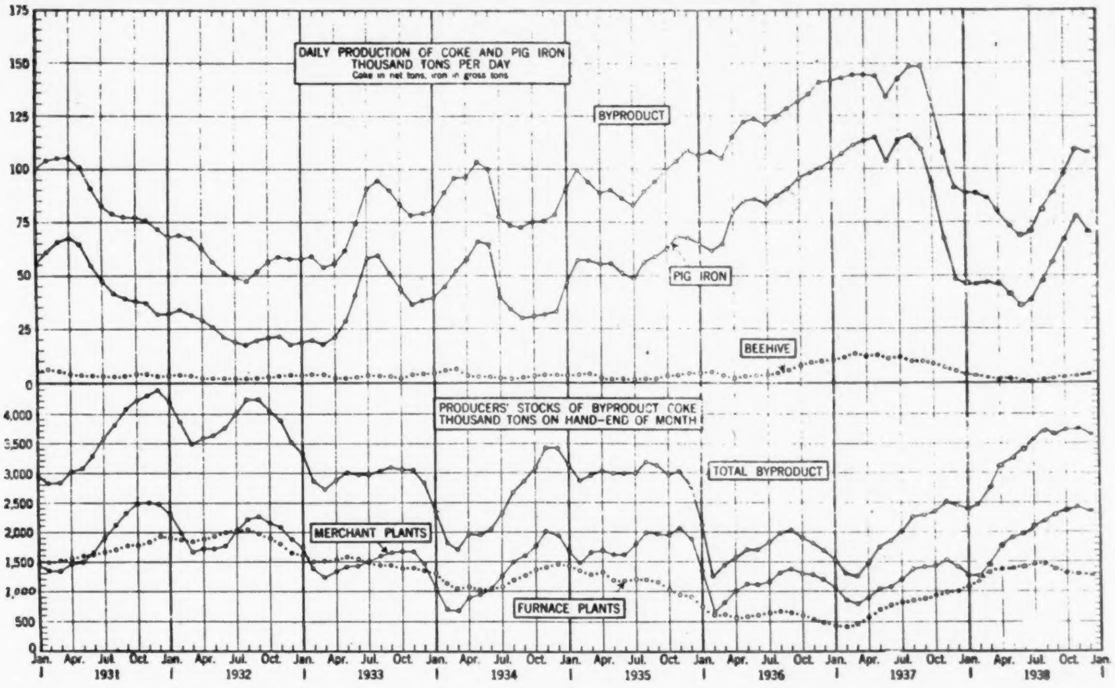
In the accompanying summary of developments in the coke industry, month-by-month, the price quotations (given at the foot of the table) have been based by the Bureau of Mines upon price per gallon, works basis, for tank lots. Quotations in the box on the previous page are taken from monthly compilations published in earlier issues of CHEMICAL INDUSTRIES.

Slow Recovery in 2nd Half of '38

The first 6 months of '38 were really a continuation of the latter half of the previous year, insofar as coke and its byproducts were concerned. The coal-tar chemical market first felt symptoms of recovery in June and July of '38. The data presented here indicate that the 2-month period, from August to October, was the turning-point in coke oven activity. At that time, automotive and steel plants were starting their production for the '39 season. Rubber tire stocks, which had been very large earlier in '38, were substantially depleted by the end of the summer, and a fairly active season in the Akron area got under way in mid-autumn. Considering the restricted amount of material available during the early Fall, the demand for benzol was excellent. At that time, a distinct betterment was noted in market inquiries for coal-tar solvents, as well as in shipping instructions against existing contracts. Coatings manufacturers, who had been holding down commitments of raw materials to a minimum, prepared for an active winter of production. The naphthalene market generally being quiet, importers of the crude material reduced the price 10c to a basis of $1.50, at the beginning of September. The severe competition in the cresylic acid trade, so noticeable in the Spring of '38, abated over the Summer, but a further reduction of 10c in the imported acid brought the price down to 65c at the end of September. During that month, light oil production increased to 10,869,902 gals., a substantial increase over the previous month's 10,284,559. The output of coal-tar products in October showed a distinct improvement over previous months, prices remaining firm. Imported crude naphthalene did a complete about-face in October. Two advances were reported, one for 10c and the other for 35c, the final market resting at $1.85.

As late as the first of December, information on prices for the current year were slow in coming to light. First half '39 contract prices were announced at unchanged levels, for creosote oil, crude and refined coal-tar and coal-tar pitch. Sellers were busily engaged in signing contracts for that half, on benzol, solvent naphtha, toluol, and xylol at existing levels. At the end of November, definite information was still lacking for other important byproducts. Despite the in-

Coke Production Data, 1938, p. 7



crease in the amount of coal-tar solvents and crudes available, there still existed in some parts of the country a slight shortage of spot stocks of benzol.

The graph above is intended to supplement the tabular summary on p. 358 opposite. It presents the trends in the coke industry during the last 8 years, but does not show data for the principal bulk byproducts, such as benzol, tar, and sulfate of ammonia.

The figures for byproduct coke are based on monthly reports received currently from each producer and are subject to slight revision on the basis of final detailed reports for the year as a whole. The data for beehive coke are estimates based on weekly shipments reported by 10 of the principal railroads serving the beehive ovens. Beginning with Jan., '38, the byproduct coke operators have reported monthly statistics of ammonia production. The figures of benzol production are estimated from the yield of coke at byproduct ovens recovering the commodity during the month.

Exports

The Bureau of Mines presents certain of the foreign trade statistics, supplemented by other data furnished separately by the Bureau of Foreign and Domestic Commerce. According to the latter Bureau, '38 exports of all coke amounted to 444,773 tons, as compared with 492,887 in the previous year. Shipments of benzol, totaling 10,613,464 gals., were barely more than half of those in '37, 20,480,711 gals. Coal-tar exports, amounting to 7,128,169 gals., compared favorably with the 7,149,851 gals. of '37. Ammonia sulfate shipments were less than half of those in the year before, 30,716 tons as against 73,916. The value of these exports, including coal-tar dyes and other related chemicals, was estimated to be $13,811,545, as compared with $20,625,740 in '37.

The Coke Industry at Year-End

In December, '38, and January of this year, a good demand was evidenced for most of the coal-tar chemicals. With year-end inventories out of the way, buyers entered the market with sizable orders. Refined naphthalene commenced to move into jobbers' hands. The imported crude material developed a fresh weakness, in early January, moving from $1.85 to $1.60 in two declines (10c and 15c). During the year-end period, the benzol market remained steady, a gradual increase in coking operations at steel mills easing considerably the scarcity of stocks in some parts of the country. Synthetic resin and plastic molding powder manufacturers increased their phenol requirements at that time. A fair inquiry for cresylic acid was noted. The competitive position between domestic and imported continued without much change, although no price revisions were made. Stocks of pyridine were low, and its price very firm, at 50c for refined material. Shipments of creosote oil, tar acid oil, and the cresols were moderate. Interest in most of the coal-tar intermediates began to expand, the same being true of most of the coal-tar acids. Anticipating good sales to textile and leather manufacturers, dye makers increased their production schedules.

Activity in the coke industry was at the highest level attained during the year, according to the statistics recorded for December, although this month is seasonally slow because of inventories and the intervention of the holiday period. The month was marked by a number of downward revisions in cresol prices. U. S. P. cresol was marked down ½c to 10c; special resin grade was reduced ¼c to 9c; paracresol quotations, however, were extended for the first 6 months of '39. Tar acid oils were lowered for the latter period, the 15% material being lowered 1c to 21c (carlots), while the 25% material was lowered ½c to 25c. Dimethylaniline was also down, from 26c to 23c. The outlook was fairly bright for sales to the dye and plastics manufacturers—certainly much more favorable than in the corresponding period of '37.

Outlook in First Quarter, '39

In February of this year, the upward trend of production and sales wavered, instead of experiencing the expected seasonal expansion.

Pyridine remained very firm in the reactionary movement, and phenol shipments served to steady that commodity. Only fair trading was done in creosote oil. Disinfectant manufacturers were reported to have made sizable purchases of cresylic acid in preparation for their active spring selling season. A slight slowing up by automotive and rubber trades decreased for a time the demand for the more popular coal-tar solvents. Benzol trading remained of the conservative, hand-to-month variety for a short time during the late winter months. Producers of refined naphthalene were busy re-

Coke Production Data, 1938, p. 7

Coke Production Data, 1938, p. 8

plenishing jobbers' stocks. A fair demand was still in evidence for the crude product, but most of the refiners had already contracted for their needs until June or July of this year. Imported crude naphthalene again weakened (dropping from $1.60 to $1.50), although very little of it actually changed hands in February. Coal-tar colors met with a fairly even inquiry. All intermediates, in fact, reflected the slight decline in business and industrial activity that occurred during the late winter.

March saw the resumption of the seasonal boom in the coal-tar chemical market. Coatings manufacturers supplying the automotive industry expanded their production schedules, thereby making way for a very definite improvement in the call for toluol, benzol, xylol, and solvent naphtha.

Activities in the synthetic resin industry exerted a bullish effect on phenol. Disinfectant makers were also meeting with their seasonal boom at that time, and took larger quantities of raw materials. Refined naphthalene moved steadily, with its price holding firm. The first quarter marked the resumption of business where it had left off in the latter half of '37.

Coking Units in Operation

In the accompanying table are given the capacities of coke- and coal-tar-producing plants throughout the United States. Summary also shows the distribution of coking capacities, state by state. With the entrance into operation of the several synthetic coal-tar raw material production units, which are now nearly completed, there should follow an increased demand and a widening market for coal-tar derivatives. A synthetic phenol plant is to go into operation in the near future, and may lead to the erection later on of other plants of similar design. Under the circumstances, however, the output of these plants would scarcely be expected to affect the markets for coke-derived materials. Although manufacturers of coal-tar chemicals anticipated a prosperous summer and fall business, their plans did not contemplate the outbreak of a general war. The present conflict will doubtless stimulate and hasten the planning of new coking units, as well as of additional synthetic coal-tar plants. The break in production caused by the prolonged coal strike of this Spring will probably be bridged by the extra tonnages to be turned out in the last quarter of this year, when all available plants will work at, or near, capacity. In fact, most coking plants were reported to have had on hand adequate stocks to carry them through the strike, although slowing up of schedules may have been ordered as a precaution.

STATUS OF BYPRODUCT COKE PLANTS DURING 1938

State	In existence December 31		Making coke during year		Making ammonia during year		Making benzol during year		Idle throughout year		Idle end of December		Abandoned during year	
	Number	Capacity per day (net tons of coke)	Number	Capacity per day (net tons of coke)	Number	Capacity per day (net tons of coke)	Number	Capacity per day (net tons of coke)	Number	Capacity per day (net tons of coke)	Number	Capacity per day (net tons of coke)	Number	Capacity per day (net tons of coke)
Alabama	8	14,766	7	15,223	7	15,223	7	15,223	1	612	2	1,890	..	....
Colorado	1	2,233	1	2,233	1	2,233	1	2,233	..	....	..	....	..	....
Illinois	8	12,382	8	12,460	7	12,260	2	4,973	..	....	1	3,165	..	....
Indiana	6	22,118	5	20,589	5	20,589	4	18,834	1	190	1	190	..	....
Maryland	1	5,088	1	5,088	1	5,088	1	5,088	..	....	..	....	..	....
Massachusetts	2	3,553	2	4,393	2	4,393	1	4,281	..	....	..	....	1	90
Michigan	10	8,714	8	7,572	8	7,572	3	6,793	1	138	1	138	..	....
Minnesota	3	2,572	3	2,572	3	2,572	1	875	..	....	..	....	..	....
New Jersey	2	2,793	2	2,750	2	2,750	..	....	..	....	..	....	..	....
New York	8	14,859	8	14,949	8	14,949	5	11,041	..	....	..	....	..	....
Ohio	15	26,361	14	23,893	14	23,893	13	22,843	1	1,064	1	1,064	..	....
Pennsylvania	12	46,058	12	45,939	12	45,939	9	43,625	..	....	1	205	..	....
Tennessee	1	350	1	350	1	350	1	350	..	....	..	....	..	....
Utah	1	705	1	705	1	705	1	705	..	....	..	....	..	....
West Virginia	4	5,511	4	5,088	3	4,318	4	5,088	..	....	..	....	..	....
Connecticut, Kentucky, Missouri, Rhode Island, and Wisconsin	6	6,627	6	6,364	4	4,547	3	4,030	..	....	..	....	..	....
Total	88	174,690	83	170,168	79	167,381	56	145,982	4	2,004	7	6,652	1	90
At merchant plants	42	43,290	40	43,356	36	40,569	18	23,832	2	328	4	1,811	1	90
At furnace plants	46	131,400	43	126,812	43	126,812	38	122,150	2	1,676	3	4,841	..	....

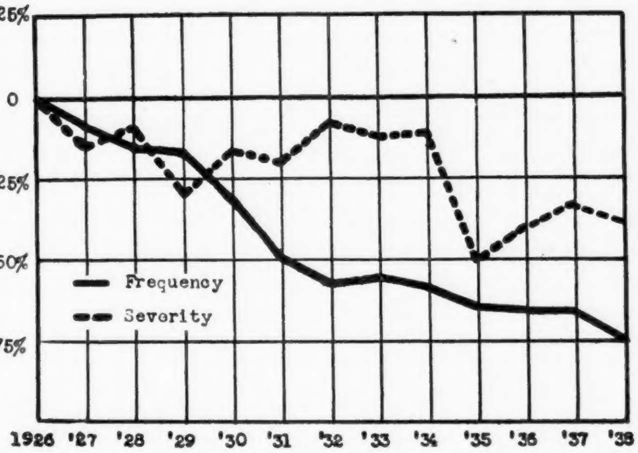
Accident Rates, Chemical Industry, 1938, p. 3

The annual report of the National Safety Council on the accident record of the chemical industry indicates that the 1938 average frequency rate was 7.93 and the average severity rate 1.23. The injury experience of the chemical industry is based on reports from 307 plants in which employees worked 260,522,000 man-hours during the year. The frequency rate of 7.93 is 35% below the average for all industries, and the severity rate of 1.23 is 20% below the general average. In comparison with 30 major industries, chemical plants ranked 8th in frequency and 18th in severity.

Compared with 1937, the frequency declined 23% and the severity 38%. These improvements exceed the average reductions by all industries. Since 1926, the reduction in the frequency rate has amounted to 75% and that in the severity rate has amounted to 38%. Chemical plants have made better than average progress in reducing frequency, but they have not quite kept pace with the all-industries improvement in severity.

Large plants had the lowest injury rates in '38, averaging 6.85 for frequency and 1.14 for severity; they also made the most improvement in comparison with 1937. Manufacturers of plastics had lower frequency rates than any other division of the industry, averaging 2.80. Coal tar distillers had the lowest severity rates, averaging 0.17. The latter group also made the largest '37-'38 improvement in both injury rates, reducing frequency 72% and severity 98%.

Percentage Changes in Accident Rates, Chemical Industry



Reports covering 222 serious injuries occurring during the past five years show that the principal mechanical causes of such injuries were: unsafe processes and working methods, poor housekeeping, and improper guarding. Improper attitudes, more especially disobedience of instructions, were the most important personal causes.

The Du Pont plant at Old Hickory, Tenn., continues to hold the best known all-time, no-injury record in the industry—11,361,846 man-hours. This is also the best record of any industry. The industry has made good progress in reducing the frequency of injuries as shown by a decrease of 23% from 1937, and a total reduction of 75% since 1926. The average reduction by all industries during the last 12 years has amounted to 68%. Results in severity, however, have not been equally good. While the reduction of 9% from 1937 to 1938 exceeded the general improvement, the decrease of 38% since 1926 is somewhat less than the average reduction for all industries.

The chemical industry's general improvement in injury rates from 1937 to 1938 is due to reductions in permanent partial and temporary total disabilities. Between the two years, fatalities actually increased 8%. All types of injuries have decreased in frequency and severity since 1926. The largest reductions have been made in temporary total disabilities. Fatalities have decreased only 10% during this period.

Industry	Frequency Changes 1937 to 1938	Frequency Changes 1926 to 1938	Severity Changes 1937 to 1938	Severity Changes 1926 to 1938
Chemical	—23%	—75%	— 9%	—38%
All Industries	—16%	—68%	— 5%	—44%
Textile	—24%	—65%	— 5%	+18%
Tanning & Leather	—13%	—58%	—56%	—34%
Paper & Pulp	—26%	—72%	—48%	—69%
Non-Ferrous Metals	—22%	—64%	—19%	—13%

Experience by Type of Injury

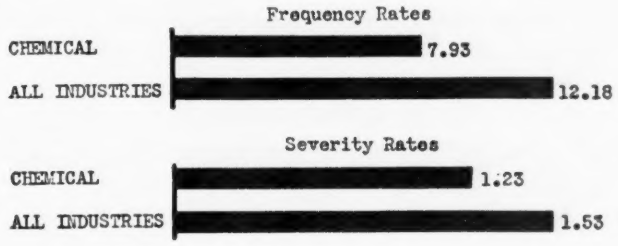
	All Injuries	Death and Perm. Total	Perm. Partial	Temp. Total
1938 Frequency Rate	7.93	.13	.51	7.29
1938 Severity Rate	1.23	.78	.30	.15
Change in Frequency 1937 to 1938	—23%	+ 8%	—24%	—24%
Change in Severity 1937 to 1938	— 9%	+ 8%	—32%	—29%
Change in Frequency 1926 to 1938	—75%	—10%	—52%	—76%
Change in Severity 1926 to 1938	—38%	—10%	—65%	—74%

Experience in Plants of Different Sizes

Small plants had an average frequency rate twice that of large organizations. Large plants also showed the greatest improvement from 1937, reducing frequency 58% and severity 18%.

Size Group*	1938 Frequency Rate	1938 Severity Rate	1937-1938 Change in Frequency	1937-1938 Change in Severity
Large	6.85	1.14	—58%	—18%
Small	14.38	1.15	—12%	+ 4%

* Units are divided into large and small groups when the number in a classification is between 10 and 29. Units are grouped on the basis of exposure, and the separation is so made that the same number of units is contained in each group.



Manufacturers of plastics had the lowest frequency rate in the chemical industry during '38, averaging 2.80; coal tar distillers had the best records in severity with an average rate of 0.17. Fertilizer and salt companies had the highest frequency rates, exceeding 20.0. Average severity rates were especially high in plants producing industrial gases, fertilizer, dyes, and vegetable oils.

Coal tar distillers made the most outstanding improvement over '37 experience, in reducing frequency 72% and severity 98%. Injury rates also decreased sharply in plants manufacturing plastics, carbon products, and miscellaneous chemicals. On the other hand, sharply higher rates were reported by plants producing industrial gases and vegetable oils.

Accident Rates, Chemical Industry, 1938, p. 3

Accident Rates, Chemical Industry, 1938, p. 4

Disabling Injuries, 1938, Chemical Industry, by Industrial Groups

Industrial Group	No. of Industrial Units	Man-Hours Worked (Thousands)	Average Number of Employees	No. Disabling Injuries: Total Death and Perm.	No. Disabling Injuries: Perm. Partial	No. Disabling Injuries: Temporary	No. Disabling Injuries: Total	Number of Days Charged: Death and Perm. Total	Number of Days Charged: Perm. Partial	Number of Days Charged: Temporary	Number of Days Charged: Total	Injury Rates: Frequency	Injury Rates: Severity
All Groups	307	260,522	130,555	35	133	1,899	2,067	210,000	72,222	37,604	319,826	7.93	1.23
Acid Manufacturing	21	17,233	8,667	3	7	80	90	18,000	4,360	2,975	25,335	5.22	1.47
Alcohol & Solvents Mfg.	6	1,907	941	0	1	17	18	0	210	226	436	9.44	.23
Carbon Products	12	7,752	4,345	0	5	24	29	0	3,212	638	3,850	3.74	.50
Chlorine & Alkali Manufacturing	11	10,939	5,213	1	8	71	80	6,000	4,765	1,559	12,324	7.31	1.13
Coal Tar Distillers	16	1,051	522	0	0	9	9	0	0	176	176	8.56	.17
Dye Manufacturing	6	10,095	5,110	3	10	44	57	18,000	5,865	1,030	24,895	5.15	2.47
Explosives Manufacturing	29	24,435	12,492	3	13	168	184	18,000	4,305	3,347	25,652	7.53	1.05
Fertilizer Manufacturing	11	8,642	4,295	4	7	164	175	24,000	8,650	3,071	35,721	20.25	4.13
Industrial Gases	5	3,720	1,823	3	1	9	13	18,000	600	822	19,422	3.49	5.22
Paint & Varnish Manufacturing	23	21,102	10,645	4	4	118	126	24,000	5,460	2,180	31,640	5.97	1.50
Pharmaceutical & Fine Chemical Manufacturing	21	27,068	13,406	7	9	313	329	42,000	6,725	4,246	52,971	12.15	1.96
Plastics Manufacturing	9	9,629	4,764	0	7	20	27	0	2,947	427	3,374	2.80	.35
Salt Manufacturing	13	4,642	2,251	1	2	91	94	6,000	600	1,460	8,060	20.25	1.74
Soap Manufacturing	30	24,899	12,681	0	27	276	303	0	6,376	4,243	10,619	12.17	.43
Vegetable Oil Manufacturing	26	6,974	3,335	2	7	74	83	12,000	2,860	1,414	16,274	11.90	2.33
Not Otherwise Classified	68	80,434	40,065	4	25	421	450	24,000	15,287	9,790	49,077	5.59	.61

Causes and Types of Accidents

A detailed analysis of the above-mentioned 222 serious injury cases discloses that the three principal agencies of injury were machinery working surfaces (e.g., floors and ladders) and chemicals. These three figured in 56% of the 222 cases. Types of machinery most often reported were presses, rolls, pumps, fans, and mixers.

Industrial Group	1937-1938 % Change in Frequency	1937-1938 % Change in Severity
Entire Industry	—23	— 9
Acid Mfg.	—27	+ 8
Alcohol & Solvent Mfg.	—99	+ 64
Carbon Products	—17	— 9
Chlorine & Alkali Mfg.	—31	— 15
Coal Tar Distillers	—23	— 9
Dye Mfg.	—25	+ 61
Explosives Mfg.	+ 8	— 25
Fertilizer Mfg.	—17	— 9
Industrial Gas	+97	+146
Paint & Varnish Mfg.	—24	— 5
Pharmaceutical & Fine Chemical Mfg.	—16	184
Plastic Mfg.	—72	— 98
Salt Mfg.	+14	+ 6
Soap Mfg.	— 2	— 73
Vegetable Oil Mfg.	+71	+ 44
Not Otherwise Classified	—42	— 41

About half of the serious injuries occurred when employees were caught in, or between, moving parts of equipment. Falling, sliding, and flying objects were second in importance, occurring often when employees were handling materials. Eleven per cent. of all injuries resulted from falls from one level to another.

The Personal Factor in Safety

Common thoughtlessness was responsible for a high percentage of casualties. For example, a workman attempted to pass closely to high tension wires while carrying a pipe. It contacted a wire and the employee suffered a shock and was thrown 30 feet to the ground. Standing under suspended loads is another example of personal carelessness.

Starting, stopping, or otherwise operating equipment without authority, or without giving or getting the proper signal, or without taking the customary precautions when about to repair or inspect devices having movable parts, were other contributory causes of accidents in the chemical industry.

U. S. Chemical Patents
Off. Gaz.—Vol. 504, Nos. 1, 2, 3, 4—p. 129

A Complete Check-List of Products, Chemicals, Process Industries

Agricultural Chemicals

Chlorthymol vapor, as a parasiticide and germicide for newly incubator-born chicks. No. 2,164,316. William H. Engels, to Merck & Co., Inc., both of Rahway, N. J.

Polymeric diphenyl, or triphenyl, as insecticides for protecting green logs and lumber from wood boring insects of the beetle type. No. 2,164,328. Harold R. Hay, to Monsanto Chemical Co., both of St. Louis, Mo.

Parasiticide, comprising the reaction product of aqueous Paris green, calcium arsenate, and alkaline-earth hydroxide held at 150-250 deg. F., said product being characterized by a relatively high degree of stability with regard to water-soluble arsenic content. No. 2,164,568. Ralph N. Chipman, Plainfield, and Frank J. Seibert, Bound Brook, N. J., to Chipman Chemical Co., Inc., Bound Brook, N. J.

Pest-control composition, comprising as an essential ingredient a sulfurized nicotine having a sulfur content of about 17%, in which the sulfur and nicotine have combined in substantially equimolar parts. No. 2,165,030. Euclid W. Bousquet, to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Parasiticide, comprising a sulfide of phosphorus as the essential ingredient. No. 2,165,206. Raymond F. Bacon, Bronxville, N. Y. and Isaac Bencowitz, Gulf, Tex., to Texas Gulf Sulphur Company, Houston, Tex.

Insecticide material capable of producing transparent emulsions with water, containing mineral spray oil, nicotine oleate, potassium oleate, an alkyl or cyclo-alkyl alcohol, and an alkaline metal salt of sulfonated oleic acid. No. 2,165,486. Paul W. Jewel and William E. Bradley, Los Angeles, Calif., to Union Oil Company of California, Los Angeles, Calif.

Fertilizer, comprising absorbent granules of inert matter impregnated with ammonia sulfate and muriate of potash, and coated with a mixture of mineral black and carbon black. No. 2,165,592. Lewis Treeland, Kansas City, Kans.

Insecticidal composition, containing a morpholide of a carboxylic acid, having a nucleus of at least 6 carbon atoms. No. 2,166,118. Euclid W. Bousquet and Paul L. Salzberg, to E. I. du Pont de Nemours & Company, both of Wilmington, Del., a corp. of Del.

Insecticidal chemical, the mono-isobutylamide of 10,11-undecylenic acid, being a colorless, oily material melting at 24-25 deg. C. No. 2,166,119. Euclid W. Bousquet, to E. I. du Pont de Nemours & Company, a corp. of Del., both of Wilmington, Del.

Insecticidal material, being a solution in water of an aciamide of pyrethrum. No. 2,166,120. Euclid W. Bousquet, to E. I. du Pont de Nemours & Company, a corp. of Del., both of Wilmington, Del.

Insecticidal dusting powder, comprising finely-divided walnut shell powder (less than 100-mesh) impregnated with a dinitro alkyl phenol. No. 2,166,121. Alfred M. Boyce, Riverside, Calif.

Insecticidal dusting powder, comprising redwood flour impregnated with a dinitro alkyl phenol. No. 2,166,122. Alfred M. Boyce, Riverside, Calif.

Parasiticidal oil consisting substantially of liquid aliphatic mono-olefinic hydrocarbons of very high boiling-point. No. 2,166,500. Arthur L. Lyman, Berkeley, Calif., to Standard Oil Company of California, a corp. of Del., San Francisco, Calif.

Cellulose

Manufacture, by a continuous process, of hard, dense sheet products from ligno-cellulose fiber. No. 2,167,440. William H. Mason, to Masonite Corp., both of Laurel, Miss.

Recovery of lignin from vegetable material substantially free from resin, comprising treating the material with liquid sulfur dioxide, filtering the solution, and evaporating the filtrate to recover the solid residue of lignin. No. 2,167,556. Judson G. Smull, Bethlehem, Pa., to Stacom Process Corp., Long Island City, N. Y., a corp of New York.

Chemical Specialties

Friction element, comprising infusible phenolic resin compounded, in powder form, with a binder therefor. No. 2,164,326. Mortimer T. Harvey, East Orange, N. J., to The Harvel Corp., a corp. of New Jersey.

Adhesive tape, comprising in combination a backing and an adhesive thereon, including halogenated rubber plasticized by a tack-producing plasticizer compatible to said backing. No. 2,164,359. Clauss Burkart Strauch, New York City, to Minnesota Mining & Manufacturing Co., St. Paul, Minn.

Gasket composition, comprising rubber hydrochloride, asbestos, and a basic heat stabilizer for said rubber hydrochloride. No. 2,164,368. Herbert A. Winkelmann to Marbon Corp., both of Chicago, Ill.

Extreme-pressure lubricant, comprising a lubricating oil having dispersed therein between 0.1 and 2.0% of a thio-ether comprising 2 aromatic radicals at least one of which contains an ester substituent. No. 2,164,393. Elliott Alfred Evans, to C. C. Wakefield & Co. Ltd., both of London, England.

Fibrous material, resistant to oil, grease, and hydrocarbons, comprising a fibrous base provided with 2 superimposed flexible coatings; the first, in contact with the base material, being a moisture-resistant plasticized cellulose derivative and the second a hydrocarbon-resisting, water-miscible protein glue or gum flexibilized with an aqueous solution of a polyhydric sugar or alcohol. No. 2,164,495. Kenneth R. Brown, Tamaqua, Pa., to Atlas Powder Co., Wilmington, Del.

Fluid-pressure transmission and heat-exchange medium, comprising aqueous solution of one of the group consisting of piperazine and alkyl-substituted piperazines. No. 2,164,564. Edgar C. Britton, Howard S. Nutting, and Peter S. Petrie, to The Dow Chemical Co., all of Midland, Mich.

Non-corrosive, fluid-pressure transmission and heat-exchange medium comprising aqueous solution of an aliphatic alcohol from the class consisting of non-corrosive, fluid-pressure transmission and heat-exchange medium comprising aqueous aliphatic alcohols containing an aralkylamine inhibitor. No. 2,164,565. Edgar C. Britton, Howard S. Nutting, and Peter S. Petrie, to The Dow Chemical Co., all of Midland, Mich.

Adhesive composition, comprising in part of aqueous, colloidal salt of a cellulose mono-nuclear aralkyl ether carboxylic acid having its ethereal oxygen atom joined to the aryl nucleus through an alkyl radical having not over 4 carbon atoms. No. 2,164,585. Winfried Hentrich, Dusseldorf-Reisholz, and Rudolf Kohler, Dusseldorf, Germany, to Henkel & Cie., G.m.b.H., Dusseldorf-Holthausen, Germany.

Brushless shaving cream, comprising oleaginous and aqueous materials, emulsified with a minor proportion of a phosphatide. No. 2,164,717. Wolf Kritchevsky, to Rit Products Corp., both of Chicago, Ill.

Metal polish, alcohol-free, containing about 15 parts, (by weight) fine silica, 1 part ammonium carbonate, 4 parts ammonium soaps of coconut fatty acids, 20-25 parts water, and less than 1 part free ammonia. No. 2,164,810. Marcellus T. Flaxman, Wilmington, Calif., to Union Oil Co. of California, Los Angeles, Calif.

Cement composition, comprising a dry, granular mixture of about 47% Portland cement clinker, 3% gypsum, 30-47% precipitated calcium carbonate, and 3-20% clay. No. 2,164,871. Adelbert C. Eichenlaub, Dearborn, Mich., to Peerless Cement Corp., Detroit, Mich.

Friction element, comprising friction material and a bond for same, the latter being the reaction product of cashew nut-shell liquid and formaldehyde. No. 2,165,140. Mortimer T. Harvey, East Orange, N. J., to The Harvel Corp., of New Jersey.

Water-resistant, flexible abrasive product, consisting of backing having adherent thereto abrasive material, the bond being a cashew nut-shell oil resin, impregnated with a chromium compound. No. 2,165,186. Charles R. Walker, to Abrasive Products, Inc., both of South Braintree, Mass.

Cutting and cooling oil preparation, being an alkaline, oleaginous composition emulsifiable with water, consisting of 50-90% mineral lubricant, 1-20% sufurized fatty oil, ½-3% glycol ether, ½-3% water, 1-30% mahogany soaps, ½-10% rosin, and about 0.6% strong alkali. No. 2,165,436. John C. Zimmer, Hillside, and John B. Holtzclaw, Roselle, N. J., to Standard Oil Development Company, Delaware.

Carpet cleaning composition, comprising a mixture of buckwheat flour, petroleum cleaning oil, a water-insoluble stearate soap, and salicylic acid, all taken up in water. No. 2,165,586. Clair W. Studer and Roy G. Roshong, North Canton, and Marie Miller, Aultman, Ohio, to The Hoover Company, North Canton, Ohio.

Stable antiknock motor fuel, containing gasoline and tetraethyl lead, and having also contained therein a small amount of lecithin and of an aromatic amine or phenol. No. 2,165,651. Harry V. Rees and Johan C. D. Oosterhout, Port Arthur, Tex., to The Texas Company, New York, N. Y.

Starch paste composition, being water-free and water-resistant, comprising a mixture of dehydrated starch having absorbed therein a water-immiscible, neutral organic liquid, and a starch swelling agent of the group consisting of amines and chloral. No. 2,165,834. Harold E. Bode, Chicago, Ill., to Corn Products Refining Company, New York, N. Y.

Fire extinguishing foaming agent, consisting of alkali metal salts of hydrocarbon aromatic sulfonic acids derived from the sulfonation of petroleum distillate oil, mixed with a lesser proportion of benzol. No. 2,166,008. Cameron B. Holter and Ernest L. Stewart, Port Arthur, Tex., to The Texas Company, New York, N. Y.

Ice glaze for preserving frozen flesh foods, comprising an ice film rendered non-cracking by the presence of benzoic acid in the water from which the ice is made. No. 2,166,113. Robert Henry Bedford, New York, N. Y.

Viscous hair shampoo, being an aqueous solution of lauryl mono-ethanolamine sulf-acetate and mono-ethanolamine sulfate. No. 2,166,127. Frank J. Cahn and Morris B. Katzman, Chicago, Ill.

Poison mixture for use in cartridges for trap guns, containing alkali cyanide, magnesia and capsicum. No. 2,166,168. Ethel P. Marlman, Las Animas, Colo., to The Humane Fur Getter, Inc., a corp. of Colorado.

Spray-dried alkyl sulfate detergent, being a mixture of sulfonated and unsulfonated higher paraffinic alcohols. No. 2,166,315. Wilfred S. Martin, to The Procter & Gamble Company, a corp. of Ohio, both of Cincinnati, Ohio.

Lens-cleansing cloth, having cotton fibres impregnated with tin hydroxide. No. 2,166,570. Attilio Panissidi, Woodhaven, N. Y.

Moistureproof, cellulosic sheeting, being a thin, transparent cellulose organic ester sheet coated with a wax-gum film of water-resistant material. No. 2,166,711. Norman F. Beach, by mesne assignments to Eastman Kodak Co., both of Rochester, N. Y., a corp of N. J.

Composition of matter, comprising finely-divided peanuts and added free glycerine. No. 2,166,806. Robert Newell DuPuis, Charles William Lenth, and John B. Segur, Chicago, Ill., to Association of American Soap and Glycerine Producers, Inc., New York, N. Y., a corp. of Delaware.

Margarine product, comprising an emulsion of milk with an oil, the latter being a partially hydrogenated vegetable oil containing a major proportion of glycerides of iso-oleic acids. No. 2,167,113. Carl H. Haurand, North Plainfield and Ralph H. Neal, Bayonne, N. J., and Hans W. Valteich, New York, N. Y., to The Best Foods, Inc., New York, N. Y., a corp. of Del.

Stable, clear, and translucent emulsion of vitamin-bearing fish liver oil, glycerol, a glyceride of oleic acid, and sucrose. No. 2,167,144. Raymond W. Barton and Warren M. Cox, Jr., to Mead Johnson & Co., all of Evansville, Ind.

Brushless shaving cream, comprising a plastic emulsion of oleaginous and aqueous materials, and containing a minor proportion of an aromatic sulfonate. No. 2,167,180. Wolf Kritchevsky, to Rit Products Corp., both of Chicago, Ill., a corp of Del.

Fireproofing composition, comprising a mixture of a number of precipitated water-insoluble metallic oxides from the group consisting of stannic oxide, cupric oxide, manganese dioxide, and lead dioxide, the whole being suspended in a chlorinated resin releasing hydrogen chloride upon being heated. No. 2,167,278. Martin Leatherman, Hyattsville, Md.

Hair rinse, including one of the group consisting of phthalic acid; potassium acid phthalate; furoic acid; and water-soluble coal-tar dye. No. 2,167,502. Russell R. Frew, Mercer Island, Wash., to Golden Glint Co., Inc., Seattle, Wash.

Coal Tar Chemicals

Preparation of 3.3'-dicarboxy-6,6'-disulfo-4,4'-diamino diphenyl salts. No. 2,164,932. Eugene A. Markush, Jersey City, and Julius Miller, Newark, N. J., to Pharma Chemical Corp., New York City.

Separation of ortho- and para-amino-ethyl-benzenes from their admixtures. No. 2,165,165. Robert R. Dreisbach and James Day, to The Dow Chemical Co., all of Midland, Mich.

U. S. Chemical Patents
Off. Gaz.—Vol. 504, Nos. 1, 2, 3, 4—p. 129

U. S. Chemical Patents

Off. Gaz.—Vol. 504, Nos. 1, 2, 3, 4—p. 130

Preparation of an anthraquinone-benzacridonylamine compound. No. 2,165,618. William Dettwyler, Milwaukee, Wis., to E. I. du Pont de Nemours & Company, Wilmington, Del.

Process yielding dinaphthylamines from the interaction of a naphthylamine and a naphthol. No. 2,165,747. Elmer William Cook, New York, N. Y., to Tide Water Associated Oil Company, Bayonne, N. J.

Manufacture chlor-methyl alkyl phenols. No. 2,165,956. Arnold Brunner, Frankfort-on-the-Main, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Production nuclear alkyl derivatives of phenols; method comprises interaction of aromatic compound with a long-chain alkyl halide in the presence of a zinc compound acting as condensing agent. No. 2,166,136. Lawrence H. Flett, Hamburg, N. Y., to National Aniline & Chemical Co., Inc., a corp. of N. Y., New York, N. Y.

Preparation a benziminazole derivative that is soluble in dilute caustic alkali, capable of coupling with diazo groups, and containing a carbonyl group adjacent to a methylenyl group. No. 2,166,198. Wilfred Archibald Sexton, Blackley, Manchester, England, to Imperial Chemical Industries Ltd., a corp. of Great Britain.

Preparation of a para-toluidine derivative, a yellow powder, soluble in organic solvents (e.g., acetone and ethyl acetate) and lending to the solutions therefrom a yellow tint capable of dyeing upon esters and ethers of cellulose. No. 2,166,487. Friedrich Felix and Rudolf Ruegg, to Society of Chemical Industry in Basle, all of Basel, Switzerland.

Manufacture alkoxyl derivatives of nitro-aromatic compounds. No. 2,166,917. Harry McCormack and Gervase J. Stockmann, to North Shore Coke & Chemical Co., all of Chicago, Ill.

Manufacture of solid aromatic hydrocarbons by destructive hydrogenation of petroleum distillates. No. 2,167,339. William J. Sweeney, Westfield, N. J., to Standard I. G. Co.

Coatings

Manufacture a pyroxylin coating, waterproof and adherent to ink and water-sensitive adhesives. No. 2,165,291. Rowland B. Mitchell, Athol, Mass., to Athol Manufacturing Company, Athol, Mass.

Manufacture a textile finish having a pearly, silken appearance, prepared from a solidified lather of cellulosic material. No. 2,165,393. Leon Lilienfeld, Vienna, Austria.

Process coating metallic surfaces with a cellulose-cellulose nitrate composition. No. 2,166,261. William Henry Moss, London, England, to Celanese Corporation of America, a corp. of Del.

Coating composition, comprising polystyrene plasticized with beta-ethoxy-ethylene glycol 2-chloro-phenoxy-acetate. No. 2,166,557. Sylvia M. Stoesser and Arnold R. Gabel, to The Dow Chemical Co., all of Midland, Mich.

A casein paint formula, consisting of casein, borax glass, sodium fluoride, calcium hydroxide, and a zinc sulfide pigment coated with a trace of a salicylic compound. No. 2,167,221. Herman A. Scholz, Oak Park, Ill., to United States Gypsum Co., Chicago, Ill., a corp. of Ill.

Bake enamel, comprising a mixture of polymerized ester of acrylic acid and polymerized acrylonitrile, and an organic solvent consisting of a mixture of diethylene dioxide, chlorbenzene, cyclohexanone, dichlor-diethylene ether, and ethylene glycol diacetate. No. 2,167,537. Carlos Tobis, Berlin-Oberschoneweide, Germany, to General Electric Co., a corp. of New York.

Dyes, Stains, etc.

Preparation a tri-diazo derivative of a triamino-diphenyl. No. 2,164,524. Henry Jordan and Swanie S. Rossander, to E. I. du Pont de Nemours & Co., all of Wilmington, Del.

Preparation of the chromium complex salt of a peri-dicarbonyl derivative of an ortho-hydroxy-meta-carboxylic aniline. No. 2,164,767. Wilhelm Eckert, Frankfort-on-the-Main-Hochst, Germany, to General Aniline Works, Inc., New York City.

Preparation a water-soluble leuco sulfuric acid ester of 2,1(N),7,8(N)-anthraquinone dibenzacridone; ester yields, on oxidation, rich reddish-blue shades on cellulose fibers. No. 2,164,782. Milton A. Prahl, Milwaukee, and William L. Rintelman, Carrollville, Wis., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Manufacture of a water-soluble leuco sulfate of C,C′-di(anthraquinone-1,2-selenazole). No. 2,164,783. Milton A. Prahl, Milwaukee, Wis., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Production beta-beta-dihalo-anthraquinone dithiazoles. No. 2,164,784. William L. Rintelman, Carrollville, and William Dettwyler, Milwaukee, Wis., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Preparation a linear disazo-aryl derivative of a paraffinic hydrocarbon. No. 2,164,785. Swanie Siguard Rossander, to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Preparation a disazo-aryl derivative of a paraffinic hydrocarbon, soluble in water. No. 2,164,786. Swanie Siguard Rossander, to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Manufacture of the new dye intermediate, one of the di(amino-aroyl)-alkylene diamines. No. 2,164,787. Swanie Siguard Rossander, Wilmington, Del., and Carlton Webster Croco, Woodstown, N. J., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Manufacture a polymethine dyestuff. No. 2,164,793. Carl Winter and Nikolaus Roh, Ludwigshafen-on-the-Rhine, Germany, to General Aniline Works, Inc., New York City.

Method for reducing a vat dyestuff to the leuco form, using formamidine-sulfinic acid as the reductant. No. 2,164,930. Herbert August Lubs, to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Method of purifying dyestuffs of the polyaminoanthraquinone class. No. 2,164,952. Karl Josef Schwing, East Orange, N. J.

Manufacture disubstituted guandine salts of metalliferous azo dyes. No. 2,165,034. Herbert W. Daudt and Chester W. Hannym, to E. I. du Pont de Nemours & Co., all of Wilmington, Del.

Blue print coating composition, comprising a light-sensitive ferric salt, soluble ferricyanide, and sufficient of an amidine salt. No. 2,165,166. Garnet Philip Ham, Old Greenwich, Conn., to American Cyanamid Co., New York City.

Manufacture a formylmethylene derivative containing naphthalene as one of the heterocyclic nuclei. No. 2,165,218. Leslie G. S. Brooker, Rochester, N. Y., to Eastman Kodak Company, Jersey City, N. J.

Dyestuff, resulting from the reaction of 2 formylmethylene compounds, each having different aromatic nuclei as constituents of their respective heterocyclic structures. No. 2,165,219. Leslie G. S. Brooker, Rochester, N. Y., to Eastman Kodak Company, Jersey City, N. J.

Coloring of acetate silk with 1-amino-4-para-benzene-azo-anilino-anthraquinone-2-sulfonic acid. No. 2,165,257. Richard Walter Hardacre, Norman Ellershaw Holden, and Cecil Shaw, Blackley, Manchester, England, to Imperial Chemical Industries Limited, Great Britain.

Method of bleaching cottons with hypochlorite solutions. No. 2,165,270. Hans O. Kauffmann, Buffalo, N. Y., to Buffalo Electro Chemical Company, Inc., Buffalo, N. Y.

Method of bleaching cellulosic fibers with aqueous chlorine and chlorine dioxide. No. 2,166,330. George P. Vincent, to Mathieson Alkali Works, Inc., both of N. Y. City.

Manufacture of a dyestuff of the class consisting of sulfonates of 1-alkylamino-4-arylamino-anthraquinone. No. 2,166,352. Robert Norman Heslop and William Wyndham Tatum, Grangemouth, Scotland, to Imperial Chemical Industries Ltd., a corp. of Great Britain.

Manufacture of a diazoamino-compound, one of the groups being an aniline arsonic acid, the other a sulfonated primary or secondary amine. No. 2,166,681. Hans Sduard Fierz-David and Willy Gerhard Stoll, Zurich, Switzerland, to Compagnie Nationale de Matières Colorantes et Manufactures de Produits Chimiques du Nord Réunies, Etablissements Kuhlmann, Paris, France, a corp. of France.

Method for preparing leuco quinazarine. No. 2,167,070. Emeric Havas, Pitman, N. J., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Manufacture of an azo dyestuff from the arylide derivative of 2:3-hydroxy-naphthoic acid. No. 2,167,142. Frithjof Zwilgmeyer, Arden Del., to E. I. du Pont de Nemours Co., Wilmington, Del., a corp. of Del.

Explosives

Process manufacturing trimethylol-nitromethane, comprising the condensation of nitromethane with formaldehyde in an alkaline medium consisting of an alkanol having 4-6 carbon atoms. No. 2,164,440. Joseph A. Wyler, to Trojan Powder Co., both of Allentown, Pa.

Manufacture a coherent felt combustion train element, of burning speed less than 250 secs./yd., being a fibrulated cellulose material, impregnated with a black powder. No. 2,164,509. James Sinton Bruce Fleming, Ardrossan, and Russell Charrosin Payn, Salcoats, Scotland, to Imperial Chemical Industries, Ltd., of Great Britain.

Process for melting, purifying and casting sucrose octanitrate. No. 2,165,435. Joseph A. Wyler, Allentown, Pa., to Trojan Powder Company, Allentown, Pa.

Manufacture a dense, granular ammonium nitrate. No. 2,166,579. Robert W. Cairns, to Hercules Powder Co., a corp. of Del., both of Wilmington, Del.

Fine Chemicals

Photographic developer containing 1-15% protein decomposition products No. 2,164,687. Max Nassau. Berlin-Wilmersdorf, Germany, to Chemische Fabrik Grunau, Landshoff & Meyer Akt. Ges., Berlin-Grunau, Germany.

Manufacture of thrombin from fibrin. No. 2,164,804. Hans Dyckerhoff, Munich, Germany.

Process producing sound traces on photographic film, by means of fatty printing dyes. No. 2,164,828. Friedrich Lierg, one-half to Oskar Czeija, both of Vienna, Austria.

Manufacture of an invertase preparation. No. 2,164,914. Herbert C. Gore, Scarsdale, George Kirby, Yonkers, and Charles N. Frey, Scarsdale, N. Y., to Standard Brands Inc., New York City.

Separation of invertase from yeast. No. 2,164,936. Glennard E. Miller, New York, and Robert F. Light, Mount Vernon, N. Y., to Standard Brands, Inc., New York City.

Conversion of 2-keto-hexonic acid esters to the corresponding saccharosonic acids. No. 2,165,151. Richard Pasternack, Brooklyn, N. Y., and Peter P. Regna, North Bergen, N. J., to Charles Pfizer & Co., Brooklyn, N. Y.

Manufacture a 4,4′tricarbocyanine salt. No. 2,165,337. Leslie G. S. Brooker, Rochester, N. Y., to Eastman Kodak Company, Rochester, N. Y.

Manufacture a photographic silver salt emulsion containing a sensitizing merocarbocyanine dye. No. 2,165,338. Leslie G. S. Brooker and Frank L. White, Rochester, N. Y., to Eastman Kodak Company, Rochester, N. Y.

Preparation a photographic silver salt emulsion containing a sensitizing dye having a heterocyclic structure possessing reactive, unsaturated groups. No. 2,165,339. Leslie G. S. Brooker, Rochester, N. Y., to Eastman Kodak Company, Rochester, N. Y.

Production of a hardened photographic gelatin, said emulsion containing 0.05-0.1% formaldehyde and 0.1% to 0.5% resorcylic aldehyde. No. 2,165,421. Samuel E. Sheppard and Robert C. Houck, Rochester, N. Y., to Eastman Kodak Company, Rochester, N. Y.

Manufacture an acetic acid catalyst, consisting of small amounts of oxides of zinc and manganese, and larger amounts of copper oxides, all bound together with pasty binder. No. 2,165,428. George P. Waugh, Rochester, N. Y., to Eastman Kodak Company, Rochester, N. Y.

Production esters of polynuclear hydroxyketones. No. 2,165,655. Leopold Ruzicka, Zurich, Switzerland, to Society of Chemical Industry in Basle, Basel, Switzerland.

Synthesis a heterocyclic formylmethylene compound. No. 2,165,692. Leslie G. S. Brooker, Rochester, N. Y., to Eastman Kodak Company, Rochester, N. Y.

Manufacture gelatinous colloids. No. 2,166,074. John Reichel, Philadelphia, Pa., to Sharp & Dohme, Incorporated, Philadelphia, Pa.

Manufacture of a metallic complex salt, the reaction product of a phenol and a nitrite of a platinum group metal. No. 2,166,076. Edgar F. Rosenblatt, East Orange, N. J., to Baker & Co., Inc., Newark, N. J.

Preparation a gold keratinate having therapeutic application. No. 2,166,133. Adolf Feldt, Berlin-Charlottenburg, Karl Schollkopf, Berlin-Dahlem, and Adolf Schmitz, Berlin-Friedenau, Germany.

Catalytic hydrogenation of dinitriles to diamines. No. 2,166,150. Benjamin W. Howk, to E. I. du Pont de Nemours & Company, a corp. of Del., both of Wilmington, Del.

Catalytic hydrogenation of adiponitriles to hexamethylene diamines. No. 2,166,151. Benjamin W. Howk, to E. I. du Pont de Nemours & Company, a corp. of Del., both of Wilmington, Del.

Preparation a photographic emulsion comprising an alkoxy monophenol (ortho- or meta-), whose alkyl member has at least 8 carbon

atoms. No. 2,166,181. Paul L. Salzberg, Wilmington, Del., and Clayton F. A. White, Parlin, N. J., to Du Pont Film Mfg. Corp., a corp. of Del., New York, N. Y.

Hydrogenation of aliphatic dinitriles. No. 2,166,183. Frank K. Signaigo, to E. I. du Pont de Nemours & Company, a corp. of Del., both of Wilmington, Del.

Process of preparing antineuritic substances. No. 2,166,233. Edwin R. Buchman, Pasadena, Calif., to Research Corp., a corp. of N. Y., New York, N. Y.

Preparation a tetra-benzo- triaza-porphin. No. 2,166,240. Charles Enrique Dent, London, England, to Imperial Chemical Industries, Ltd., a corp. of Great Britain.

Preparation the nitrile of alpha-vinyl-lactic acid. No. 2,166,600. Ernst Otto Leupold, Hofheim-im-Taunus, and Heinrich Vollman, Frankfort-am-Main, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-am-Main, Germany.

Process treating a photographic element having at least 2 superimposed layers, each containing water-insoluble silver salt image record. No. 2,166,617. John R. Weber, South River, and Virgil B. Sease, New Brunswick, N. J., to DuPont Film Manufacturing Corp., New York, N. Y., a corp. of Del.

Preparation sensitizing dyes having a complex vinylene-heterocyclic nuclear structure. No. 2,166,736. Frank L. White and Grafton H. Keyes, to Eastman Kodak Co., both of Rochester, N. Y., a corp. of N. J.

Preparation a highly acid-adsorptive, colloidal aluminum hydroxide. No. 2,166,868. Harold W. Jones, to The Columbus Pharmacal Co., both of Columbus, O.

Preparation a pure, crystalline corticosterone, having the definite formula $C_{21}H_{30}O_4$, and melting at 180-182 deg. C. No. 2,166,877. Tadeus Riechstein, Zurich, Switzerland, by mesne assignments to Roche-Organon Inc., Nutley, N. J., a corp. of N. J.

Preparation a photographic emulsion containing a sensitizing pseudocyanine dye. No. 2,166,938. Burt H. Carroll, to Eastman Kodak Co., both of Rochester, N. Y., a corp. of N. J.

Vitamin E composition. No. 2,167,002. August J. Pacini, Chicago, Ill., by mesne assignments to U. S. Vitamin Corp., New York, N. Y., a corp. of Del.

Process for the preparation of derivatives of estradiol. No. 2,167,132. Rezso Weisz, Budapest, Hungary, to the firm Chinoin Gyogyszer Es Vegyeszeti Termekek Gyara R. T. (Dr. Kereszty and Dr. Wolf). Ujpest, Hungary, a corp. of Hungary.

Production of crystalline ergosterol. No. 2,167,272. Walter A. Carlson, Minneapolis, Minn., to General Mills Inc., a corp. of Del.

Preparation compounds having the piperidine structure. No. 2,167,351. Otto Eisleb, Hofheim in Taunus, Germany, to Winthrop Chemical Co., Inc., New York, N. Y., a corp. of New York.

Industrial Chemicals

Manufacture esters of 1,4-dioxanediol-2,3 from 2,3-dichlorodioxane-1,4. No. 2,164,355-6. Harold R. Slagh, to The Dow Chemical Co., both of Midland, Mich.

Preparation diesters of 1,4-dioxanediol-2,3. No. 2,164,357. Harold R. Slagh, to The Dow Chemical Co., both of Midland, Mich.

Process for freezing fruit for preservation, in an ice-cold, invert sugar solution. No. 2,164,362. Robert B. Taylor, near Knoxville, Tenn.

Manufacture a filter-aid of diatomaceous earth containing a small amount of acidic flux selected from the group consisting of hydrofluosilicic and boric acids. No. 2,164,500. Arthur B. Cummins and Lewis B. Miller, Plainfield, N. J., to Johns-Manville Corp., New York City.

Manufacture ethylene diamine cymenesulfonate. No. 2,164,587. Ralph H. McKee, New York City, and Carl T. Bahner, Conway, Ark.

Recovery of sulfur dioxide from sulfuric acid sludges decomposed by coking. No. 2,164,637. David W. Bransky, to Standard Oil Co., both of Chicago, Ill.

Manufacture of melamine, such that the product is obtained from the reaction vessel in a molten state. No. 2,164,705. Willi Fisch, Riehen, Switzerland, to Society of Chemical Industry in Basle, Basel, Switzerland.

Apparatus for continuous electroplating of metal articles. No. 2,164,-710. Frank A. Hatch, South Hanson, Mass., to D. A. Gurney Co., Whitman, Mass.

Manufacture a therapeutic and cosmetic base, comprising fatty alcohol, water, and a resin alcohol homogenized to a stable, plastic mass. No. 2,164,723. Walther Schrauth, Berlin-Dahlem, and Kurt Stickdown, Dessau-Rosslau, Anhalt, Germany, to Deutsche Hydrierwerke Aktiengesellschaft, Berlin-Charlottenburg, Germany.

Production nitromethane by contacting methane with nitric acid while both are in the vapor phase. No. 2,164,774. George K. Landon, to Hercules Powder Co., both of Wilmington, Del.

Manufacture amino-carboxylic acids as dye-stuff bases, being water-insoluble, colorless powders. No. 2,164,781. Carl Platz, Frankfort-on-the-Main, and Johann Rosenbach, Wiesbaden, Germany, to General Aniline Works, Inc., New York City.

Hydrolytic decomposition products derived from the epidermis of hogs after removal of bristles therefrom. No. 2,164,798. Charles H. Campbell, Kent, Ohio.

Continuous process manufacturing fuel briquettes from pulverized coal bonded with an asphalt base. No. 2,164,933. Henry F. Maurel, Providence, R. I., to Maurel Investment Corp., Providence, R. I.

Granulation of calcium cyanamid, using a sugar solution as grinding lubricant. No. 2,164,986. George E. Cox, Niagara Falls, N. Y., and Walter G. McBurney, Niagara Falls, Ont., Canada, to American Cyanamid Co., New York City.

Manufacture a carbon zinc element for dry batteries. No. 2,165,061. Frank MacCallum, Birmingham, Eng., to Maxolite Holdings Limited, Kingsway, London, England.

Spray-sintering process for manufacture of cement. No. 2,165,084. Helmut Wendeborn, Frankfort-on-the-Main, Germany, to American Lurgi Corp., New York City.

Reduction of fluorine content of concentrated phosphoric acid, by superheated steam aeration of the acid bath. No. 2,165,100. Ames B. Hettrick, Piney River, Va., to Virginia Chemical Corp., of Delaware.

Photosensitive oxidation catalyst for hastening the drying of exterior paint coatings. No. 2,165,130. Mayne R. Coe, Washington, D. C.

Method coking coal with superheated steam in a vertical coking unit. No. 2,165,143. Lewis C. Karrick, Salt Lake City, Utah.

Apparatus for separating heavy substances from a liquid stream of variable rate of flow. No. 2,165,152. Max Pruss and Heinrich Blunk, Essen, Germany.

Greasing method for baking devices, comprising the setting of a melted fat on the crust-contacting surface of said device. No. 2,165,154. Iva de Freese Savage, Jersey City, N. J.

Method of purifying elemental sulfur from carbonaceous material, while in the molten state. No. 2,165,170. Napoleon Arthur Laury, Rockville Centre, N. Y., to The Calco Chemical Co., Inc., Bound Brook, N. J.

Method producing a coke-impregnated bauxite. No. 2,165,173. Blakeslee Barnes, to Chemical Constructions Co., both of New York City.

Sodium aluminate, forming stable solutions, and containing about 0.5% SiO_2 based on total solids. No. 2,165,187. William S. Wilson, Boston, and Alban J. Lobdell, Jr., Woburn, Mass., to Monsanto Chemical Co., a corp. of Delaware.

Manufacture normal ferric sulfate. No. 2,165,189. William S. Wilson, Brookline, and John F. White, Somerville, Mass., to Monsanto Chemical Co., a corp. of Delaware.

Method of impregnating cellulosic fibers to render them hydrophobic. No. 2,165,287. Lewis M. McBride, Corozal, C. Z.

Separation of acetic and butyric acids from their aqueous admixtures. No. 2,165,293. Gale F. Nadeau and Webster E. Fisher, Rochester, N. Y., to Eastman Kodak Company, Rochester, N. Y.

Apparatus for feeding dry materials by means of steam pressure. No. 2,165,321. William R. Wertz, Glendale, Calif.

Apparatus for applying film coatings to selected portions of articles. No. 2,165,364. Enoch T. Ferngren, Little Neck, N. Y., to Fernplas Corporation, Toledo, Ohio.

Process distilling substances in vacuo. No. 2,165,378. Kenneth C. D. Hickman, Rochester, N. Y., to Distillation Products, Inc., Rochester, N. Y.

Manufacture of insoluble metal silicates. No. 2,165,578. Ernest Wayne Rembert, Plainfield, N. J., to Johns-Manville Corporation, New York, N. Y.

Separation of a non-drying oil from its admixture with partly polymerized vegetable and marine oils. No. 2,166,103. Otho M. Behr, Redondo Beach, Calif., to Vegetable Oil Products Co., Inc., Los Angeles, Calif., a corp. of Del.

Method and apparatus for indicating oxygen concentration in a gaseous medium. No. 2,166,104. Franklin Rudolf Collbohm, to Douglas Aircraft Company, Inc., both of Santa Monica, Calif., a corp. of Del.

Method for the purification of petroleum mahogany sulfonates. No. 2,166,117. Manuel Blumer, Butler, Pa., to L. Sonneborn Sons, Inc., a corp. of Del.

Termination of rest period of deciduous trees, by injection into the tree 2-12 weeks prior to budding time a very small amount of a dinitrophenol. No. 2,166,123. Alfred M. Boyce, Riverside, Calif., William H. Chandler, Berkeley, Calif. and Marston H. Kimball, Alhambra, Calif.

Manufacture esters of sulfocarboxylic acids, as textile assistants. Nos. 2,166,141-5. Benjamin R. Harris, Chicago, Ill.

Preparation a viscous, film-maintaining electrolyte comprising an alkali salt of rosin. No. 2,166,179. Samuel Ruben, New Rochelle, N. Y.

Manufacture an edible product from whipped mashed potatoes that have been quickly frozen to inhibit hydrolysis therein. No. 2,166,278. Sterling W. Alderfer, Akron, Ohio.

Method decolorizing and clarifying gelatin, comprising heating same with hydrated aluminum oxide in neutral solution, of 3-11% concentration, at 55-75° C. No. 2,166,297. Rene Jules Fernand Jacquet, Cortenberg, Belgium, to Tannerie & Maroquinerie Belges (Societe Anonyme), Saventhem, near Brussels, Belgium, a corp. of Belgium.

Manufacture a spray-dried alkyl sulfate detergent, comprising a mixture of water-soluble salt of a higher alkyl sulfonic acid and a primary or secondary higher alkanol. Nos. 2,166,314-5. Wilfred S. Martin, Norwood, Ohio, to The Procter & Gamble Co., a corp. of Ohio, Cincinnati, Ohio.

Method of producing semicoke or coke from carbonizable solid fuel material. No. 2,166,321. Alfred Pott, Essen-Ruhr, Germany.

Processing of yeast, by adding to the ferment during the propagation period small amounts of guanidine derivatives of hypophosphoric acid together with guanidase. No. 2,166,339. Harold H. Browne, Brooklyn, N. Y.

Preparation a dry mixture of calcium hypochlorite salt, to which has been added 4-30% sodium pyrophosphate and a fixed proportion of sodium carbonate. Nos. 2,166,362-3. James Douglas MacMahon, Niagara Falls, N. Y., to The Mathieson Alkali Works, Inc., a corp. of Virginia, New York, N. Y.

Process of drying oils and varnishes; method comprises the hastening of polymerization by withdrawing part of the batch and subjecting said portion to distillation in vacuo, and then returning the distillate to the original batch. No. 2,166,539. Henry Vincent Aird Briscoe, Barnes, London, England.

Manufacture an aqueous bituminous emulsion containing over 50% bitumen. No. 2,166,541. Olric B. Bray, Palos Verdes Estates, and Lawton B. Beckwith, San Pedro, Calif., to Union Oil Co. of California, Los Angeles, a corp. of Calif.

Conversion of maleic acid to maleic anhydride. No. 2,166,556. LeRoy U. Spence, Cheltenham, and John C. Mitchell, Philadelphia, Pa., to Rohm and Haas Co., Philadelphia, Pa.

Separation of ketones from a reaction mixture containing also aldehyde, hydrocarbon, and secondary alcohol, by distillation. No. 2,166,584. Richard M. Deanesly, Berkeley, Calif., to Shell Development Co., San Francisco, Calif., a corp. of Del.

Manufacture of ammonia by vapor phase catalysis of hydrogen (from cracked hydrocarbons) with nitrogen. No. 2,166,611. James H. Shapleigh, to Hercules Powder Co., a corp. of Del., both of Wilmington, Del.

Apparatus for producing gaseous carbon dioxide from "dry ice." No. 2,166,637. Roy E. McIlrath, Wilmette, Ill.

Purification of molten metal by an electro-magnetic degassing method. No. 2,166,671. Lev A. Trofimov, by mesne assignments, to Product Development and Engineering Corp., both of Cleveland, Ohio, a corp. of Ohio.

Preparation alkyl nitrites by direct esterification of alkanols with nitrous acid. No. 2,166,698. Clyve Allen, Berkeley, Calif., to Shell Development Co., San Francisco, Calif., a corp. of Del.

Process for the separation of constituents of organic mixtures containing both resin acids and fatty acids, particularly tall oil. No. 2,166,812. Frederick H. Gayer and Charles E. Fawkes, Chicago, Ill., to Continental Research Corp., Chicago Heights, Ill., a corp. of Ill.

Method raising the foaming temperature of milk to about 40° E., by homogenizing and adding to the milk 1-5% milk powder. No. 2,164,351. Herbert Stanley Samson, Winnipeg, Manitoba, Canada, two-fifths to John A. Dienner, Evanston, Ill.

Manufacture higher fatty amines by reduction of carboxylic acids with an ammonia substance in the presence of hydrogen and a suitable catalyst. No. 2,166,971. Willi Schmidt and Karl Huttner, Ludwigshafen-on-the-Rhine, Germany, to I. F. Farbenindustrie, Aktiengesellschaft, Frankfort-on-the-Main, Germany.

U. S. Chemical Patents Off. Gaz.—Vol. 504, Nos. 1, 2, 3, 4—p. 131

U. S. Chemical Patents

Off. Gaz.—Vol. 504, Nos. 1, 2, 3, 4—p. 132

Apparatus for filtering, namely a glass filter funnel of improved design. No. 2,166,980. Robert Douglas Welsh, Los Angeles, Calif.

Preparation aluminum elements, for electrolytic condensers, comprising etching in hydrochloric acid, washing, and then treating with hot glycerine. No. 2,166,990. Donald E. Gray, Yonkers, N. Y., to Cornell-Dubilier Electric Corp., a corp. of N. Y.

Separation of alkanols from their admixture with acid and water, by distillation through hot vapors of the acid. No. 2,166,997. Josef Losch, Knapsack, near Cologne-on-the-Rhine, Germany, to Aktiengesellschaft fur Stickstoffduenger, Knapsack, near Cologne-on-the-Rhine, Germany.

Process for separating fats and valuable protein materials from garbage, by digestion of such refuse with ammonia and primary ammonium phosphate, under pressure with live steam. No. 2,167,043. Hans Haneschka, Vienna, Austria.

Reduction of olefine-acetylene compounds with hydrogen, in the presence of nickel catalyst, yielding only poly-olefinic products. No. 2,167,067. Ivan Gubelmann, Wilmington, Del., and Louis Spiegler, Woodbury, N. J., to E. I. du Pont de Nemours & Co., Wilmington, Del., a corp. of Del.

Alkylene oxide-tannic acid reaction product. No. 2,167,073. Karl M. Herstein, Brooklyn, N. Y., by mesne assignments to Skol Co., Inc., New York, N. Y., a corp. of New York.

Method and apparatus for coking fuel briquettes. Nos. 2,167,099-100. Louis Philippe, Joseph Marius Benezech, Carmaux, France, by mesne assignments to Koppers Co., Pittsburgh, Pa., a corp. of Del.

Improved method for recovery of nickel carbonyl from its admixture with carbon monoxide and associated gases. No. 2,167,112. Charles Frederick Reed Harrison, Selley Oak, Birmingham and Albert Edward Wallis, Clydach, England, to The International Nickel Co., Inc., New York, N. Y., a corp. of Del.

Preparation of acetoacetic esters of aliphatic alcohols, by interaction of diketene with an alkanol at 150° C. No. 2,167,168. Albert B. Boese Jr., Pittsburgh, Pa., to Carbide and Carbon Chemicals Corp., a corp. of N. Y.

Continuous process converting olefines to alcohols and ketones. No. 2,167,203. Henri Martin Emmanuel Guinot, Niort, France, to Usines de Melle, Melle, Deux-Sevres, France, a corp. of France.

Method improving the drying quality of oils containing natural antioxidant impurities, comprising adding benzoyl peroxide in a small proportion to the oil being processed. No. 2,167,206. Theodore S. Hodgins, Royal Oak, Mich., to Reichhold Chemicals, Inc., formerly Beck, Koller, & Co., Inc., Detroit, Mich.

Apparatus for shredding alkali cellulose or like fibrous materials. No. 2,167,214. Albert Lasch, Stuttgart Bad Canstatt and Eugen Eppler, Stuttgart, Germany, to Baker Perkins Co., Ind., Saginaw, Mich., a corp. of New York.

Manufacture iron-free, basic aluminum sulfate. No. 2,167,238. Nathanas Griunsteinas, also known as Nathan Grunstein, Haifa, Palestine.

Manufacture solid bitumen materials extracted from solid, carbonaceous fuel. No. 2,167,250. Theodor Wilhelm Pfirrmann, Castrop-Rauxel, Germany, to Friedrich Uhde, Dortmund, Germany.

Waterproof coating for cement and stucco, comprising 5% sodium stearate, 2½% varnish, 7½% varnish thinner, 15% alcohol and the balance, water. No. 2,167,300. William B. Houston, Alhambra, Calif.

Fractionating apparatus, having electrostatic means to regulate the separation of vapors of different condensing points. No. 2,167,395. Charles A. Thomas, Dayton, Ohio, by mesne assignments to Monsanto Chemical Co., St. Louis, Mo., a corp. of Del.

Manufacture of caustic soda by reacting a soluble sodium salt with ammoniacal copper oxalate and recovering therefrom the sodium oxalate; latter is reacted with lime to yield caustic soda and calcium oxalate. No. 2,167,404. Henri Lawarree, Brussels, Belgium.

Process manufacturing ammonium nitrate from ammonia and aqueous nitric acid. No. 2,167,464. Donald A. Rogers, Petersburg, Va., and Charles W. Brown, Yonkers, N. Y., to The Solvay Process Co., New York, N. Y., a corp. of New York.

Leather

Tanning of hides, wherein the active agent is a sulfamate of chromium, aluminum or titanium. No. 2,165,870. David M. McQueen, Wilmington, Del., to E. I. du Pont de Nemours & Company, Wilmington, Del.

Metals and Alloys

Apparatus for condensing magnesium vapors from their admixture with carbon monoxide. No. 2,164,410. Frank R. Kemmer, Larchmont, N. Y., to Magnesium Products, Inc., Wilmington, Del.

Cyclic process producing magnesium, comprising electrolysis of molten magnesium chloride; by-product chlorine, converted into hydrogen chloride by passing over hot carbonaceous material, is used to produce further quantities of anhydrous magnesium chloride from magnesium ammonium chloride. No. 2,165,284. Samuel L. Madorsky, Washington, D. C.

Electric make-and-break contact member, comprising silver metal containing 0.005-25.000% thorium. No. 2,165,481. Franz R. Hensel and Kenneth L. Emmert, Indianapolis, Ind., to P. R. Mallory & Co., Inc., Indianapolis, Ind.

Apparatus for concentrating and separating gold-bearing ore, and for recovering the gold thereof. No. 2,166,167. John Lewis Luckenbach, Jackson Heights, N. Y.

Lubricant for drawing metal in the cold, comprising sulfurized asphaltum. No. 2,166,173. Harley A. Montgomery, Detroit, Mich.

Magnesium alloy, containing 43.5-41.0% aluminum, 26-30% zinc, 1.5-3.0% manganese, 3-6% nickel, 2-5% steel, and the balance substantially magnesium. No. 2,166,039. Fritz Christen, Zurich-Alstetten, Switzerland.

Continuous process for reducing metallic iron ores in granular form. No. 2,166,207. Walter Gordon Clark, to Clarkiron, Inc., a corp. of Nevada, both of Los Angeles, Calif.

Silver contact element, containing a small proportion of manganese and either tungsten and/or molybdenum. No. 2,166,248. Franz R. Hensel and Kenneth L. Emmert, to P. R. Mallory & Co., Inc., a corp. of Del., both of Indianapolis, Ind.

Zinc alloy, containing 4.0-5.5% copper, and as much as 0.2% aluminum. No. 2,166,338. Kurt Bayer, Magdeburg, and Arthur Burkhardt, Berlin-Lichterfelde, West, Germany, to Georg von Giesche's Erben, Breslau, Germany, a corp. of Germany.

Plastic zinc alloy, containing 2-8% copper, and 0.09-0.45% aluminum, the latter two being in the ratio (18-22)/1, respectively. No. 2,166,340. Arthur Burkhardt, Berlin-Lichterfelde, Germany, to Georg von Giesche's Erben, Breslau, Germany, a corp. of Germany.

Plastic zinc alloy, containing 0.1-1.0% each of bismuth and manganese, as much as 5.0% copper. No. 2,166,341. Arthur Burkhardt, Berlin-Lichterfelde, and Wolfgang Wolf, Magdeburg, Germany, to Georg von Giesche's Erben, Breslau, Germany, a corp. of Germany.

Method stabilizing saltpetre melts used in heat-treating alloys, comprising the addition to the bath of 2-20% alkali- or alkaline-earth chromates, molybdates, tungstates, vanadates, and manganates. No. 2,166,364. Josef Martin Michel, Bitterfeld, Germany, to I. G. Farbenindustrie, Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Heat-treating baths for metal alloys, comprising a mixture of sodium or potassium bichromate and sodium or potassium monochromate. No. 2,166,365. Josef Martin Michel, Bitterfeld, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Malleable aluminum alloy, containing 4-20% zinc, 1-3% copper, 1-2% magnesium, 0.1-1.5% manganese, 0.05-1.00% chromium, and 0.01-0.20% calcium. No. 2,166,495. Isamu Igarashi and Goro Kitahara, Fuse, Japan, to Sumitomo Kinzoku-Kogyo Kabushiki Kaisha, Osaka, Japan.

Malleable aluminum alloys, containing 4-20% zinc, 1-3% copper, 1-2% magnesium, 0.1-1.5% manganese, 0.05-1.00% chromium, and 0.01-0.20% calcium. No. 2,166,496. Isamu Igarashi and Goro Kitahara, Fuse, Japan, to Sumitomo Kinzoku-Kogyo Kabushiki Kaisha, Osaka, Japan.

Hard metal sintered composition, comprising 75-90% tungsten carbide, 5-25% tantalum carbide, and 2-20% binding metal from the iron group. No. 2,167,516. Floyd C. Kelley, Schenectady, N. Y., to General Electric Co., a corp. of N. Y.

Process for the treatment of beryllium ores. No. 2,166,659. Daniel Gardner, Rueil-Malmaison, France, to Maatschappij voor Thermo-Chemie, N. V. Arnheim, Netherlands, a company of the Netherlands.

Recovery of rare earths, comprising the conversion of rare earth sulfates into nitrates by means of alkaline earth nitrate in the presence of a slight amount of nitric acid. No. 2,166,702. Joseph Blumenfeld, Neuille-sur-Seine, France, to Societe de Produits Chimiques des Terres Rares, Paris, France.

Gold alloy, containing 33-84% gold, 11-67% copper, 0.1-5% cobalt, and 2-12% of zinc or cadmium. No. 2,166,768. Arthur W. Peterson, to Metals & Controls Corp., both of Attleboro, Mass., a corp. of Mass.

Precipitation hardened copper alloy, containing 1.5% beryllium and 2.6% cobalt. No. 2,166,794. Gerald R. Brophy, Schenectady, N. Y., to General Electric Co., a corp. of N. Y.

Sintered hard alloys containing 0.5-3.0% vanadium carbide, 0.25-1.50% molybdenum carbide, and up to 8% of cobalt, nickel, or iron in combination with the remainder, tungsten carbide. No. 2,166,795. Reinhard Chelius, Essen-Margarethenhohe, Germany, to General Electric Co., a corp. of New York.

Highly resistant, heavy-duty alloy of iron, containing chromium (8-10%), silicon (1-2%), 1.50-1.75% tungsten, and various lesser quantities of carbon, manganese, molybdenum, phosphorus, and sulfur. No. 2,166,844. Vincent T. Malcolm to The Chapman Valve Mfg. Co., both of Indian Orchard, Mass., a corp. of Mass.

Method for preparing a permanent magnet, by reduction with hydrogen of a mixture of powdered nickel, iron, titanium and cobalt, fused and sintered at high temperature. No. 2,167,240. Franz R. Hansel, to P. R. Mallory & Co., Inc., Indianapolis, Ind., a corp. of Del.

Method of determining the pH of galvanic baths, by means of a set of prepared test indicator papers. No. 2,167,304. Gerhard Kloz, Leipsig, Germany.

Glass-to-metal seal, comprising a glass containing 50-64% silica and 29.40% boric oxide, in combination with an iron alloy containing 39-43% nickel. No. 2,167,482. Albert W. Hull and Emmett E. Burger, Schenectady, N. Y., to General Electric Co., a corp. of New York.

Paper and Pulp

Apparatus for treating wood pulp or the like with chemical reagents. No. 2,166,200. Carl Busch Thorne, Hawkesbury, Ontario, Canada.

Petroleum

Process for the manufacture of wax-free lubricating oils, employing a chilling principle. No. 2,164,391. Eddie M. Dons and Dwight B. Mapes, Tulsa, Okla., to Mid-Continent Petroleum Corp., Tulsa, Okla.

Kerosene mixture, stabilized with a very small amount of lower aliphatic ketone. No. 2,165,261. Amiot P. Hewlett, Westfield, and Gerald E. Phillips, Cranford, N. J., to Standard Oil Development Company, Delaware.

Oil lubricant composition, containing a sludge inhibitor tending also to increase the viscosity. No. 2,165,324. Peter J. Wiezevich and Jones I. Wasson, Elizabeth, N. J.; said Wiezevich, by judicial change of name now, Peter J. Gaylor, to Standard Oil Development Company, Delaware.

Manufacture of lubricating oil, by polymerization of propylene and/or alpha- butylene over aluminum chloride catalyst. No. 2,165,373. Gerhard Hofmann, Leuna, Wolfgang Haag, Mannheim, and Hermann Zorn, Ludwigshafen-on-the-Rhine, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main.

Method of cracking petroleum distillates, in the manufacture of petroleum fuel. No. 2,165,587. Perry J. Sweeny, Dickinson, Tex., to Pan American Refining Corporation, New York, N. Y.

Polymerization of lower, unsaturated hydrocarbon paraffins recovered from a cracking process to yield gasoline-type hydrocarbons. No. 2,165,631. Clarence G. Gerhold, Chicago, Ill., to Universal Oil Products Company, Chicago, Ill.

Manufacture low-pour-test lubricating oil and semi-refined wax, as recovery products from a dewaxing process. No. 2,165,638. Robert E. Manley, Beacon, N. Y., to The Texas Company, New York, N. Y.

Method enriching low-octane naphtha with olefin-bearing gases, to produce a motor fuel. No. 2,165,804. Percy A. Maschwitz, Toledo, Ohio, to The Pure Oil Company, Chicago, Ill.

Manufacture of acetylene, wherein solid, pulverized carbonaceous matter is treated with gaseous hydrocarbons in an electric arc, such that acetylene is formed and removed from the area of reaction without thermal decomposition. No. 2,165,820. William H. Smyers, Westfield, N. J., to Standard Oil Development Company, Delaware.

Preparation a sodium silicate drilling mud. No. 2,165,823. William V. Vietti and Allen D. Garrison, Houston, Tex., to The Texas Company, New York, N. Y.

U. S. Chemical Patents

Off. Gaz.—Vol. 504, Nos. 1, 2, 3, 4—p. 133

Preparation a drilling mud, containing sodium silicate and one other alkali metal salt. No. 2,165,824. William V. Vietti and Allen D. Garrison, Houston, Tex., to The Texas Company, New York, N. Y.

Polymerization of hydrocarbon gases, to yield a high anti-knock fuel. No. 2,166,129. Fred M. Clotheir, Jr., Lansdowne and Hugh W. Field, Glen Mills, Pa., to The Atlantic Refining Co., a corp. of Pa., Philadelphia, Pa.

Separation of aromatic hydrocarbons from the paraffinic hydrocarbons, by selective extraction with a N-dialkyl formamide. No. 2,166,140. Virgil H. Lansley, Niagara Falls, N. Y., to E. I. du Pont de Nemours & Co., a corp. of Del., Wilmington, Del.

Thermal distillation method for separating hydrocarbon oil components. No 2,166,160. Edward P. King, Lansdowne, Pa., to The Atlantic Refining Company, a corp. of Pa., Philadelphia, Pa.

Preparation of composite crude petroleum stock to be cracked thermally to yield motor fuel. Nos. 2,166,176-7. Albert G. Peterkin, Bryn Mawr, Pa., to Houdry Process Corp., a corp. of Del., Dover, Del.

Method for refining oil by a surface-tension principle. No. 2,166,193. Charles W. Woodworth, Berkeley, Calif.

Lubricant composition, containing petroleum hydrocarbon oil and a halogenated lipoid. No. 2,166,286. Robert B. Denham, Indianapolis, Ind.

Apparatus for distilling petroleum oils. No. 2,166,374. John E. Schulze, Chicago, Ill., to Red River Refining Co., a corp. of Del., Chicago, Ill.

Process for resolving petroleum emulsions. Nos. 2,166,431-4. Melvin De Groote, University City, Mo., to Petrolite Corporation Ltd., a corp. of Del.

Method of refining oils. Nos. 2,166,502-3. Oswald H. Milmore, Berkeley, Calif., to Shell Development Company, a corp. of Del., San Francisco, Calif.

Improvement of octane number of naphtha fuel gas, by vapor-phase treatment at 900-1050 F. over a massive catalyst of Marsil clay. No. 2,166,544. Thomas Cross, Jr., Baton Rouge, La., to Standard Oil Development Co., a corp. of Del.

Hydrocarbon oil conversion to gaseous motor fuel, by a cracking process. No. 2,166,787. Joseph G. Ather, to Universal Oil Products Co., both of Chicago, Ill., a corp. of Del.

Pyrolytic conversion of hydrocarbon oils to motor fuel. No. 2,166,829. Kenneth Swartwood, to Universal Oil Products Co., both of Chicago, Ill., a corp. of Del.

Separation of wax from chilled petroleum oil, by filtration and concentration of the filtrate to increase the recovery of wax. No. 2,166,891. William P. Gee, Plainfield, N. J., to The Texas Co., New York, N. Y., a corp. of Del.

Process of treating petroleum tank bottoms. No. 2,166,893. Frank E. Holsten, Tulsa, Okla.

Conversion of solid hydrocarbon residues to motor fuel, by high-temperature cracking and high-velocity discharge into a zone at reduced pressure. No. 2,166,933. Frederick W. Sullivan Jr., Hammond, Ind., to Standard Oil Co., Chicago, Ill., a corp. of Ind.

Process for esterifying polymerized olefines. No. 2,166,981. Peter J. Wiezevich, New York, N. Y., and Ralph Rosen, Elizabeth, N. J., said Wiezevich by judicial change of name to Peter J. Gaylor; to Standard Oil Development Co., a corp. of Del.

Production of hydrocarbons. No. 2,167,004. Mathias Pier, Heidelberg, Wilhelm Michael, Ludwigshafen-on-the-Rhine, and Wolfgang Jaeckh, Heidelberg, Germany, to I. G. Farbenindustrie, Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Lubricant composition. No. 2,167,064. Melvin A. Dietrich, to E. I. du Pont de Nemours & Co., both of Wilmington, Del., a corp. of Del.

Method of Distilling hydrocarbon oils. No. 2,167,211. Ulysses S. Jenkins, St. Louis, Mo., by mesne assignments to Jenkins Petroleum Process Co., Chicago, Ill., a corp. of Ill.

Stabilized mineral oil. No. 2,167,273. Elmer William Cook, New York, N. Y., to Tide Water Associated Oil Co., Bayonne, N. J., a corp. of Del.

Process for breaking petroleum oil suspensions. No. 2,167,327. Samuel K. Talley and Carlos L. Sutzeit, Houston, Tex., to Shell Development Co., San Francisco, Calif., a corp. of Del.

Continuous process of propane dewaxing. No. 2,167,340. Ernest W. Thiele, Chicago, Ill., to Standard Oil Co., Chicago, Ill., a corp. of Ind.

Diesel fuel and method of improving same. No. 2,167,345. George C. Crandall, Woodbury, Robert C. Moran, Wenonah, and Henry G. Bergen, Woodbury, N. J., to Socony, Vacuum Oil Co., Inc., New York, N. Y., a corp. of N. Y.

Process for breaking petroleum oil emulsions. Nos. 2,167,346-9. Melvin De Groote, University City and Bernhard Keiser and Charles M. Blair, Jr., Webster Groves, Mo., by mesne assignments to Petrolite Corp., Ltd., a corp. of Del.

Lubricant composition. No. 2,167,612. Gus Kaufman, Beacon, N. Y., to The Texas Co., New York, N. Y., a corp. of Del.

Treatment of hydrocarbon oils. No. 2,167,531. Jean Delattre Seguy, Chicago, Ill., to Universal Oil Products Co., Chicago, Ill., a corp. of Del.

Treatment of hydrocarbon oils. No. 2,167,602. Walter A. Schulze, Bartlesville, Okla., to Phillips Petroleum Co., a corp. of Del.

Process for converting olefinic hydrocarbons having 1-4 carbon atoms, to liquid hydrocarbons, comprising steps of fractionating the gases thermally into a liquid portion containing mainly hydrocarbons having 3-4 carbon atoms, and a gaseous portion containing the greater part of the hydrogen, methane, ethylene, and ethane present in the original gases. No. 2,171,522. Karl Finsterbusch, N. Y., N. Y., to the Pure Oil Co., Chicago, Ill., a corp. of Ohio.

Production lubricating oil of high viscosity index and low true color, from a mineral oil containing naphthenic and parafinnic constituents, comprising extracting the mineral oil with an admixture of solvents selected from the group consisting of 40-60% chloraniline and 60-40% cresylic acid, 85-40% chloraniline and 40-60% cresylic acid, 85-40% chloraniline and 15-60% phenol, 60-40% chlorophenol and 40-60% cresylic acid, to form 2 liquid layers, separating same, and removing the solvents from the layers. No. 2,171,646. Arthur B. Brown, Hammond, Ind., and Fred F. Diwoky, Chicago, Ill., to Standard Oil Co., Chicago, Ill., a corp.

Treatment of a cracked gasoline, normally tending to form gummy substances upon storage, with a small amount of a polyhydroxyphenanthrene compound. No. 2,171,780. Geo. W. Ayers, Jr., Chicago, Ill., to Gasoline Antioxidant Co., Chicago, Ill., a corp. of Del.

Preparation an improved lubricating oil, comprising adding to a hydrocarbon oil 0.5-3.0% of a metallic erucate. No. 2,171,781. Robert C. Cantelo, Whiting, Ind., to Sinclair Refining Co., N. Y., N. Y., a corp. of Maine.

Pigments

Manufacture a titania-silica pigment. No. 2,165,315. Svend S. Svendsen, Madison, Wis., to Sherwin-Williams Company, Cleveland, Ohio.

Preparation a printing ink, comprising a pigment, a cellulose ester derivative, and a plasticizer therefore. No. 2,165,499. William Henry Moss, London, England, to Celanese Corporation of America, Delaware.

Coloring matters of the phthalocyanine type. No. 2,166,213. Isador Morris Heilbron, Manchester, England, Francis Irving, Grangemouth, Scotland and Reginald Patrick Linstead, London, England, to Imperial Chemical Industries, Limited, a corp. of Great Britain.

Process for producing pigment titanates. No. 2,166,221. Gordon D. Patterson, to E. I. du Pont de Nemours & Company, a corp. of Del., both of Wilmington, Del.

Manufacture tinted zinc sulfide pigments. No. 2,166,230. James E. Booge and Axel B. Laftman, to E. I. du Pont de Nemours & Co., a corp. of Del., both of Wilmington, Del.

Preparation a white titanium pigment stabilized with a small amount of beryllium oxide. No. 2,166,257. Willard H. Madson, Linthicum Heights, Md., to E. I. du Pont de Nemours & Company, a corp. of Del., Wilmington, Del.

Process of calcining finely divided calcium carbonate. No. 2,167,120. Thorne E. Lloyd, Netcong, N. J., to Dwight & Lloyd Metallurgical Co., New York, N. Y., a corp. of N. J.

Plastics

Preparation a resol, from a methylene-containing agent and a phenol having all particularly reactive positions occupied, but substituted in the meta-position. No. 2,165,380. Herbert Hönel, Vienna, Austria, to Helmuth Reichhold, Detroit, Mich.

Preparation a plastic hydrocolloid composition for taking dental impressions and making casts therefrom. No. 2,165,680. Johan Walter H. Stangenberg, Brevik, Sweden, and Walter S. Crowell, Melrose Park, and Charles Victor Gross, Penfield, Pa.; said Crowell, and said Gross, to The S. S. White Dental Manufacturing Company, Philadelphia, Pa.

Distillation of styrene, with added sulfur as a polymerization inhibitor. No. 2,166,125. Joseph W. Britton, Ralph F. Prescott and Robert C. Dosser, to The Dow Chemical Company, a corp. of Mich., both of Midland, Mich.

High-molecular, sulfur-containing plastics. No. 2,166,507. Rudolf Schroeter, Leverkusen-I. G. Werk, and Wilhelm Becker, Cologne-Mulheim, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Plastic composition, comprising a synthetic resin plasticized with an alpha-glycerol ether of tert.-butyl phenol. No. 2,166,518. Solomon Caplan, New York, N. Y., to Harvel Research Corporation, a corp. of N. J.

Manufacture a polyvinyl acetal resin containing a condensation product of para-tert.-amyl phenol and an aldehyde. No. 2,166,856. Kenneth Guy Blaikie and Robert Nelson Crozier, Shawinigan Falls, Quebec, Canada, assignors to Shawinigan Chemicals, Ltd., Montreal, Quebec, Canada.

Hydrogenated reaction product of a rosin ester and maleic anhydride and method for its production. No. 2,167,420. Irvin W. Humphrey, to Hercules Powder Co., both of Wilmington, Del., a corp. of Del.

Method preparing in granular form a polymeric methyl methacrylate, comprising forming by means of mechanical agitation unaided by an emulsifying agent an aqueous suspension of a finely-divided polymeric methyl methacrylate ester together with a much larger amount of that monomer, subjecting the continuously agitated suspension to a polymerizing influence, and settling the suspension by cessation of the agitation. No. 2,171,765. Otto Rohm and Ernst Trommsdorff, Darmstadt, Germany, to Rohm & Haas Co., Phila., Pa.

Production urea-formaldehyde resins, comprising the heating of a non-acidic mixture of n-butanol, one equivalent of urea and at least 2 equivalents of aqueous formaldehyde, until the reaction has at least reached the methylol urea stage, adding to the solution approximately 0.06% formic acid (based on the anhydrous weight of the reactants), and refluxing for ½-1 hour, reducing the pressure to where the mixture will boil below 80° C., distilling off all the water while replacing the butanol that may be volatilized, releasing the vacuum and resuming the distillation at atmospheric pressure until 2 mols of water have been removed for every mol of urea condensed. No. 2,171,882. Oskar R. Ludwig, Phila., Pa., to The Resinous Products and Chemical Co., Phila., Pa.

Preparation a composition of matter, comprising a drying oil having dissolved therein a reaction product of a methylene-containing substance and a trialkyl phenol, said mixture being hardenable by the action of heat at a higher rate than would be the drying oil alone. No. 2,171,914. William H. Butler, Palisades Park, N. J., to Bakelite Corp., N. Y., N. Y., a corp. of Del.

Preparation an improved product obtained by condensing a natural resin with an aromatic compound containing phenolic hydroxyl, said product being characterized by containing the group CH_2SO_3x, wherein x stands for a monovalent substituent of the group consisting of hydrogen, an alkali metal and ammonium, and being further characterized by being a water-soluble viscid to solid substance. No. 2,171,963. Ernst Koch and Christoph Thomsen, Frankfort-am-Main-Hochst, and Karl Dachlauer, Hofheim in Taunus, Germany, to I. G. Farbenindustrie A. G., Frankfort-am-Main, Germany.

Process preparing oily to resinous condensation products, comprising reacting components essentially of an aldehyde of the group consisting of formaldehyde and acetaldehyde and an ester of a carbamic acid with an alcohol containing more than 2 carbon atoms at a temperature above about 80° C., and in the presence of a compound showing an acid reaction. No. 2,171,965. Adolf Weihe, Bad Soden in Taunus, Germany, to Deutsche Celluloid Fabrik, Ellenburg, Germany.

Process casting rubber articles, comprising forming a mixture of a water dispersion of rubber and dead-burned gypsum sufficient to produce a pourable mixture, thereafter agglomerating the dispersion by adding sufficient of an agglomerating agent, molding the mixture, and vulcanizing. No. 2,171,552. Ernst Alfred Hauser, Cambridge, Mass,. to "Semperit" Osterreichisch-Amerikanische Gummiwerke A. G., Vienna, Austria.

Treatment of rubber, comprising subjecting a rubber mix containing an organic accelerator and a halogen, with an atomic weight over 35 in available form, to such conditions which tend to cause a greater degree of scorching in the absence of said halogen, and then subjecting it to vulcanizing temperature. No. 2,171,901. Norman R. Wilson, Belleville, and Arthur J. Lang, Jersey City, N. J., to Rare Metal Products Co., Belleville, N. J.

U. S. Chemical Patents

Off. Gaz.—Vol. 504, Nos. 1, 2, 3, 4—p. 134

Rubber

Manufacture an antioxidant, the reaction product of a primary or secondary arylamine with an alcohol in the presence of an oxidizing agent. No. 2,166,223. Waldo L. Semon, Silver Lake, Ohio, to The B. F. Goodrich Company, a corp. of New York, New York, N. Y.
Spongy, sound-deadening material comprising rubber, pitch, filler, softener, and dispersant. No. 2,166,236. Richard A. Crawford, Akron, Ohio, to B. F. Goodrich Co., a corp. of N. Y., New York, N. Y.
Manufacture a rubber latex-balata rubber composition. No. 2,166,324. Willis E. Reichard, Elyria, and Robert R. Olin, Akron, Ohio.
Composition of matter, comprising chlorinated rubber and a phenoxypropeneoxide derivative. No. 2,166,604. Georg Meyer, Cologne-Mulheim, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.
Vulcanizing agent for rubber, comprising a mercaptobenzothiazole derivative of a formaldehyde-amine mineral acid salt. No. 2,167,030. William E. Messer, Cheshire, Conn., by mesne assignments to United States Rubber Co., New York, N. Y., a corp. of New Jersey.
Rubber hydrohalide-salicylic acid ester compositions. No. 2,167,381. Herbert A. Winkelmann and Eugene W. Moffett, to Marbon Corporation, both of Chicago, Ill., a corp. of Del.
Vulcanization accelerator. No. 2,167,385. Marion W. Harman, Nitro, W. Va., to Monsanto Chemical Co., St. Louis, Mo., a corp. of Del.
Manufacture a phthalocyanine color paste for use as a rubber pigment material. No. 2,167,514. Maldwyn Jones and Walter Fairbairn Smith, Blackley, Manchester, England and Alexander Stewart, Grangemouth, Scotland, to Imperial Chemical Industries, Ltd., a corp. of Great Britain.

Textiles

Method for extracting a substance from its solution in another solvent. No. 2,165,438 John William Allquist, Rome, Ga., to Tubize Chatillon Corporation, New York, N. Y.
Manufacture an ink for marking rayon textiles. No. 2,165,522. William Ivan Taylor and Leslie Brisbane Gibbins, Spondon, near Derby, England, to Celanese Corporation of America, Delaware.
Manufacture a copper hydroxide suspension for treating rayon fibre. No. 2,165,667. George T. Traut, Gloucester, N. J., to New Process Rayon, Inc., Gloucester City, N. J.
Method of proofing cellulose fibre material against creasing, comprising treating a waxed fabric with an artificial resin. No. 2,166,325 Herbert Rein, Leipzig, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.
Oxygen-convertible compositions. No. 2,166,542. Theodore F. Bradley, Stamford, Conn., to American Cyanamid Co., New York, a corp. of Maine.
Manufacture of artificial silk. Nos. 2,166,739-41. Hans Karplus, Frankfort-on-the-Main, Germany, to North American Rayon Corporation, Elizabethton, Tenn., a corp. of Del.
Manufacture transparent, regenerated, cellulose film, comprising treating said film with aqueous glycerine containing lithium phosphate, the pH of the solution being 7.0-8.0. No. 2,167,105. Donald E. Drew, Kenmore, N. Y. to E. I. du Pont de Nemours & Co., Wilmington, Del., a corp. of Del.
Process for the treatment of fabrics with resin coatings. No. 2,167,234. Camille Dreyfus, New York, N. Y.
Process for improving textile material, comprising heating the material with an unsymmetric fatty-acid carbonic acid ester anhydride, the fatty-acid radical having at least 10 carbon atoms, and the carbonic acid ester having at least 2 carbon atoms to volatilize the carbonic acid radical having the lower number of carbon atoms, and to increase the water-repellence of said textile material. No. 2,171,791. Walther Kaase and Ernst Waltmann, Krefeld, Germany, to Heberlein Patent Corp., N. Y., N. Y.

Water, Sewage, etc.

Treating sewage, by aeration and screening. No 2,167,443. John G. Bevan to Guggenheim Bros., both of New York, N. Y., a copartnership.